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USSR Report

MILITARY AFFAIRS

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AVIATION AND COSMONAUTICS

No. 3, March 1983

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TRAINING ACHIEVEMENTS NOTED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 1-3

[Article by Mar Avn G. Skorikov, chief, Air Force General Staff, air force 1st deputy commander in chief: "Military-Scientific Work in the Troops"]

[Text] Together with all Soviet people and soldiers of the army and navy, the personnel of the air force are laboring to fulfill the historic decisions of the 26th CPSU Congress. The proceedings of the November (1982) CPSU Central Committee Plenum and of the Seventh Session, 10th Convocation of the USSR Supreme Soviet elicited a new influx of inspired labor in the soldiers. The airmen of the units that achieved the highest results last year are leading the socialist competition initiated in the units and subunits with the motto "Raise alertness, dependably insure the motherland's security!" In their days of hard work, they are persistently mastering aviation equipment and weapons and the tactics and methods of their application in combat, they are improving their occupational proficiency, and they are raising alertness and combat readiness guaranteeing the security of our motherland and countries of the socialist fraternity against all intrigues of aggressive forces.

In the face of a growing military danger, the Communist Party and the Soviet government are showing constant concern for maintaining the country's defense potential at the required level, and they are displaying attention to troop training and indoctrination.

Air force personnel are doing everything they can to raise combat readiness and military proficiency even higher. In their daily combat training, our airmen are learning to hit the enemy from all altitudes, to strike him with the first shell, rocket and bomb, with the first attack and the first run. This is a perpetual objective, and it demands that the soldiers exert all of their mental and physical strengths, all of their creative energy.

An analysis of the progress in fulfilling the plans of combat and political training in the months of the winter training period would show that the greatest success is being enjoyed in the program by those units and subunits in which the command, the staff and the political organs account for the achievements of scientific-technical progress and focus their attention on the planning and organization of training, flying and its support, on operational-tactical and

moral-psychological training and on the ideological and physical fitness of the air warriors.

As we know, the development of science and technology has a direct influence on the qualitative improvements in arms. In turn, new weapons require that the personnel be appropriately trained for their use and operation, and they have an influence on both the organizational structure and the methodological orientation of training. Lenin's statement that a modern army cannot be built without science is especially applicable today.

In our society, science is becoming more and more of a direct productive force, while Soviet military science is becoming the principal factor in improving the armed forces. Using Marxist-Leninist methodology, it accounts for the complexity, fluidity and diversity of military actions governed by objective laws, it insures a proper understanding of the essence, nature, and features of modern warfare, and it provides proper direction to solving the problems of military development, preparing for and conducting military actions and developing theory and practice.

Naturally, we can no longer organize combat training in the old way, without considering the latest achievements of science and technical progress. The times are such that we are urgently required to tie in theory with practice, to more actively introduce everything new and progressive born in the course of combat and political training.

The combat skills of crews, subunits and units and the moral and psychological maturity of the personnel are tested in tactical flying and combined-arms exercises, in a situation identical to the sort that may evolve in real combat. Deeply though out, well organized tactical flying exercises afford a possibility for objectively evaluating the attained level in combat training, revealing shortcomings and unutilized reserves and determining the ways and means of eliminated shortcomings. Moreover, they make it possible to develop and improve tactics, to work out new maneuvers, procedures and methods of action and to analyze their effectiveness. In order that exercise goals could be achieved, special groups are created out of not only highly qualified specialists from the units, but also representatives of the academies and scientific institutions. It is within the capabilities of such collectives to develop the plan and the organization of exercises and to conduct such exercises at a high scientific level. They are capable of objectively and knowledgeably processing and evaluating the attained results, and suggesting practical recommendations. It is no accident that exercises are referred to as a school of combat proficiency.

Indicative in this respect are the exercises "West-81" and "Shield-82." In them, the personnel of the subunits and units of different branches of aviation received an impression of the nature of modern warfare and worked out the problems of coordinating with ground troops when penetrating defenses, exploiting the success of an offensive, supporting airborne and marine assault landings, and achieving air superiority. The subunit and unit commanders that participated in these exercises exercised their skills of controlling the combat activities of groups in the air performing various missions. The personnel of support units acquired good experience in organizing support to the activities of aviation in the field.

The experience of these and other exercises has been meticulously studied. Military theory and practice have been enriched with new conclusions, and the commanders, staffs and political organs have received the corresponding recommendations, which they are now following in the organization and conduct of combat training. It should be noted at the same time that practical introduction of newly developed military-scientific ideas is just one aspect of the effort. Another, which is no less important, is constantly, persistently improving existing tactics and searching for new, effective ways to use equipment and weapons in the units. There is good reason why it is said that he who seeks, moves forward, and he who stands in place, invariably falls behind. All useful things that are discovered in the course of combat training must be deeply analyzed, carefully checked out, calculated, exercised and introduced into practice. Only a truly scientific approach of this sort can produce good results.

It is impossible today to achieve stable successes in combat and political training without deep knowledge of the theory and practice of military affairs, pedagogics, psychology and the laws of social development. Today, every commander, staff officer, political worker, pilot, navigator, engineer, technician and junion aviation specialist is a direct participant of the scientific-technical revolution. The success in fulfilling an assigned mission depends to one extent or another on every soldier. It was noted back during the 25th CPSU Congress: "Success of the scientific-technical revolution and its favorable influence upon the economy and upon all aspects of the society's life cannot be insured by the efforts of scientific workers alone. The inclusion of all participants of social production, of all elements of the economic mechanism in this historically significant process is acquiring an increasingly greater role."

However, the revolution in science and technology demands fundamental changes in the style and methods of control and leadership, a real respect for science and the ability and desire to seek its advice and reckon with it.

Interest in military science has risen significantly in the air subunits and units. Commanders, staffs, and political workers performing the day-to-day missions of combat and political training have started studying and generalizing the experience of the best teachers in training and indoctrinating air warriors and of the masters of combat application more deeply, and they have started seeking the most effective forms and methods of mastering modern equipment and weapons and making maximum use of their possibilities, and the best methods of conducting combat activities. The effectiveness of this work depends on the level of military-theoretical, occupational and technical knowledge possessed by commanders and all officers, and on their ability to tie in their research with immediate practical needs.

The following question often arises when the achievements in combat and political training are compared: Why does everything go well with one commander while another suffers many shortcomings and failures? This is not a simple question, and it cannot be answered simply. What is very important in this case is to deeply penetrate into the essence of what the commander is doing, how he is doing it and possibly what he would do in a particular situation that evolves.

After all, there are as many opinions as there are people, and there are as many solutions as there are minds. But one thing is clear: The decision of a well trained commander is always competent, well conceived and supported by calculations. It precludes unjustified losses and provides a possibility for winning in combat with the fewest forces and the best results. Herein lies his power.

This is precisely the way personnel of the regiment that was commanded until recently by Military Pilot-Sniper Colonel V. Kot perform their missions. Possessing good organizational capabilities, deep military and special and outstanding piloting skills, the commander was able to unify a strong, workable collective and to inspire it to attack the highest summits of combat training. True, there was a time when the personnel did receive a low score in a combat readiness inspection. The regiment commander meticulously studied the state of affairs, and the remarks and recommendations of the inspectors. Measures to eliminate the shortcomings were thought out and worked up, and unutilized reserves were found. The unit's staff and training council did everything they could to make the subsequent program fully in keeping with scientific organization of flight labor. The main thing on which attention was focused was the search for ways to improve the aerial and tactical skills of the pilots and their moral and psychological training. Many had to work hard. But 2 years later the unit made its way to the top in relation to all indicators and won the USSR minister of defense's pennant for courage and military valor.

The personnel and commanders of the subunits have been taught to act independently and to make creative decisions. The commander himself is always in the forefront, in the most critical areas. Once in an exercise the unit was given the mission of striking a target in a remote place. After studying the situation on maps and photographic plotting boards, Colonel Kot determined the bearing of the attack run, after which he paired up with another pilot to scout the target, he evaluated the situation, and he assigned concrete missions to the groups. Following careful preparation he took off with the first group and controlled the actions of the subunits from the air, right as they were striking the target. The personnel completed their mission in full, and with high quality. This example confirms once again that initiative and creativity are, in the hands of a competent, persistent and demanding commander, a powerful weapon in the fight for high results.

Unfortunately some commanders feel that only scientific organizations and institutions should concern themselves with scientific developments and research, that all innovations in tactics and combat application should be born and receive further development in the tranquility of offices and laboratories, that there is neither time nor possibility in the troops for this, and that the units should receive ready-made ideas and recipes. But I think that such commanders are seriously mistaken, and thus they are hindering development of creative thinking by all subordinates. The experience shows that specialists of air units who are capable of analyzing a given phenomenon posses a highly valuable quality: On one hand they have a precise idea of the needs and demands of practice, and its bottlenecks, while on the other they are substantially trained, and they possess the abilities and habits of scientific inquiry. Moreover the units enjoy broad possibilities for improving training and indoctrination, and for finding new, effective combat procedures to be used when

organizing coordination of different tactical groups with other branches of aviation and in flight leadership and control of the combat activities of subunits.

The logical scheme behind the scientific approach to solving a given problem is relatively simple: First we create a mental model, then we perform calculations, in the next stage we test out the idea in the air, we study the results, we perform additional calculations, and then once again we experiment. After this the new procedure, method or tactic is introduced into practice. As a method of scientific investigation, simulation has truly unlimited possibilities. For example by creating a model of an attack on a ground or sea target, or of aerial combat, a pilot or commander can not only study the properties of the real processes of combat and their peculiarities in different combat situations, but also develop his tactical thinking. Combat flights and the actions of a group or subunit must be simulated because under certain conditions it is difficult and sometimes even impossible to realistically use some weapons or some new tactics, to make an attack or to surmount or penetrate air defenses. Analysis of these questions using models and acquisition of dependable information as a result have extremely important significance to selection of optimum variants of action insuring effective completion of the missions posed to the group or subunit.

The unit's instructor training council, which is staffed by the most experienced officers, plays an important role in this regard. The members of the instructor training council must work not from one incident to another, but all of the time, deeply penetrating into the problems of organizing and improving combat training. They must keep an eye on everything of interest to raising the proficiency of air warriors and their combat readiness. Such an attitude would exclude ill-conceived and hasty decisions, and in turn, this will raise the quality of combat training and increase flight safety. In a number of cases something that is discovered in the course of combat training must be subjected to deeper analysis and generalization. This is precisely where scientific organizations could provide significant assistance, determine the validity of a proposal and provide the appropriate recommendations. But this requires close ties between the air units and the military academies and research institutions.

The collectives of the Air Force Academy imeni Yu. A. Gagarin and the Air Force Engineer Academy imeni N. Ye. Zhukovskiy are doing a great amount of scientific work aimed at solving the most important theoretical and practical problems. The professors and instructors of the departments are attentively studying the work experience of the best units, studying the most important aspects of operational art and tactics, of the organization of control over combat activities in the air, and support and interaction, and they are searching for effective methods of training, indoctrination and exercise, and the forms and methods of moral, political and psychological preparation of the airmen. Much emphasis is placed on studying the work experience of commanders and staffs that controlled units and formations during the Great Patriotic War, so that this experience could be utilized today.

Student circles sponsored by military scientific societies created in the academy departments are receiving special attention. Participation in research

on certain topics makes the students interested in scientific activity. This itself is a major achievement. We can be sure that when an officer with such a background reaches the troops, he will study particular phenomena of social life and the realities of combat more deeply, he will interpret them correctly and scientifically, and on this basis he will make competent decisions. It must be said that participation of students in tactical flying exercises conducted in the units is a favorable means of testing their scientific preparedness. It is the duty of commanders and political organs to see that this work is the most effective, and to organize good apprenticeship for the students.

Military scientific work in air units is an important element of combat and political training. When properly established and well organized, it opens up broad possibilities for improving training and for searching for new, effective methods and tactics of combat work and unutilized reserves. "These reserves," said CPSU Central Committee general secretary, Comrade Yu. V. Andropov at the November (1982) CPSU Central Committee Plenum, "must be sought in acceleration of scientific-technical progress, in broad and fast introduction of scientific and technical achievements and the best experience into production."

Military scientific and miliary practical conferences must play an important role in raising the effectiveness and quality of military scientific work in the units. Unfortunately, unit commanders, staffs and political workers are still not deveoting enough attention to this form of military scientific work. Meticulous preparations must be made for conferences and reports. The latter should be more than just lectures; they must be concrete, they must rest on practical results, they must reflect the content of combat training, and they must contain scientifically grounded conclusions and recommendations. The work experience of the best commanders, staffs and political organs must be persistently studied, analyzed, generalized and disseminated, and everything new and progressive that arises in the course of the combat training activities of the troops must be broadly publicized.

Practical introduction of new military scientific ideas is no less important today than the development of these ideas. Without practice, theory is lifeless, but at the same time there is nothing more practical than good theory. Theory and practice are in a dialectical unity, and this unity must be brought about by commanders who deeply understand the role of science in modern life.

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IMPORTANCE OF WEAPONS, WEAPON SYSTEMS KNOWLEDGE STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 4-5

[Article by Col V. Vladimirov, military pilot 1st class: "By the Mind and Weapons"]

[Text] The night flying shift was coming to an end. The last crews were fulfilling their assignments in accordance with the planning table. Another bomber taxied over to the parking pad. And not long after, I happened to hear the following conversation among the pilots.

"A pilot might maintain all of the parameters precisely, and travel his route correctly, but he still can't do better than the automatic systems," said one.

"But I think that 'smart' systems are intended primarily for smart pilots," another said.

After exchanging a few more thoughts the pilots headed for the tower.

I could not help thinking: "Yes, the officer was right. 'Smart' instruments are effective only in competent hands." A modern bomber is in fact a highly intricate complex, the electronic systems of which facilitate the work of the crew in the air. By using them properly, it can achieve exceptionally high piloting precision in all conditions. But this does in fact require a "smart pilot" to feed the appropriate data into the system. Deep knowledge obtained on the ground, practiced actions concerned with different legs of the route and rehearsal of various contingency situations insure that the airmen will work efficiently in the air.

Of course, pilots may sometimes be heard saying that because every exercise is described in detail in the appropriate documents, any manifestation of initiative is supposedly equivalent to a deviation from an assignment. Consequently if we follow their logic, there is no room for creativity. But this is not so. Creative inquiry is necessary in all phases of performing an assignment, and primarily on the ground, while preparations are being made for flying. Of course, it is difficult to foresee everything that may happen in the air, but possible deviations in the actions of the crew are always foreseen in the main and alternate variants of approaching the target and making the strike. For example, working out the tactics of attacking a target, pilots presuppose that changes will occur in the flight profile, in their position relative to other airplanes in the group during the performance of a particular maneuver, in the order of sighting and firing, and in the manner of withdrawing from combat.

But what do we do if everything has been accounted for correctly and everything is done strictly in accordance with the assignment but the results of the strike are nonetheless unsatisfactory? We must invariably seek the true cause, though this is not always simple.

Once during training at the practice range some of the bomber crews came up with results that barely warranted a "satisfactory" grade. This was the first time this happened in a long time. An analysis of the flight recorder data revealed that the crew did strictly maintain the prescribed flight and attack parameters en route and over the practice range. What was the cause behind the great deviation? The calculations were rechecked once again. Everything was in order.

No one doubted the preparedness of the pilots. It was simply bewildering: Everything had been done correctly, but the mistakes were significant. After checking some of the details of the situation, the navigator and I took off for the practice range to perform a similar assignment. We had to work things out for ourselves. We reached the target area. We maneuvered the airplane onto its bomb run. The parameters were strictly as prescribed. Bombs away! After withdrawing from the attack the flight leader at the practice range reported the score: "satisfactory." There was no sense in expending any more ammunition.

At the airfield the pilots and navigators once again meticulously checked the results. Military Navigator 1st Captain G. Kovylin found the mistake. Having analyzed the available data, he came to the conclusion that the time of fall of a bomb may influence bombing accuracy. Knowing the caliber and ballistic characteristics of the bomb, the navigator discovered that this time of fall was incorrect. On rechecking his figures, Kovylin reported his ideas to the commander. The captain was right. Imagine the amount of resources that would have been expended uselessly, had he not been as sharp.

Soon after, this incident was a topic of discussion at a party meeting held on the eve of the next tactical flying exercise. The communists discussed the unutilized reserves, revealed the reasons behind shortcomings and suggested concrete proposals for improving preliminary and preflight preparations of the crews and for raising their professional skill and psychological maturity.

A certain work style has already evolved in our collective. On learning what they had to do to prepare for the exercise, the airmen immediately got to work. The crewmembers first thoroughly studied the region of future activities and the typical radar and visual reference points, and they calculated the profile of the approach to the practice range and the targets. All pilots and navigators participated in drawing up the program. The flight commanders simply monitored and guided their activities. This method made it possible to train the crews for independent solution of difficult problems, and it taught them to think with tactical competence and with initiative.

Before the tactical flying exercise began, none of the airmen knew the precise airfield from which they were to take off, and therefore they studied the methods

of taking off from each of the proposed airfields. Programmers helped the flight crews to prepare the programs for manual and automatic piloting. It must be stated that besides these specialists and navigators, our pilots and the chiefs of the service groups have also been trained to correctly draw up the program. Consequently the time it takes to prepare for take-off in the tense conditions of an exercise can be reduced.

The crews devoted a great deal of attention to maneuvering within the range of "enemy" air defenses and in the face of countermeasures by "enemy" fighters.

Group coordination of pairs and flights and the problems associated with interaction and control en route to and in the vicinity of the practice range were worked out during the preparations for the exercise. We tried to get the maximum benefit from every flying shift, and each flight was completed precisely according to the combat training plan.

The engineers, technicians and mechanics made a coordinated effort. They checked and adjusted the systems, machine units and the armament controls, optimizing all of the parameters.

The work of the flight commanders was especially hard. They had to carefully prepare themselves, they had to monitor the proparations made by the pilots subordinated to them, they had to fly with them in the instructor's seat, and they had to analyze the sorties. In other words they tried to fulfill their functional responsibilities in full volume. And of course, they were made appropriately responsible for the skills of their crews. The senior chiefs, meanwhile, maintained control and helped the flight commanders with advice and recommendations.

The practice existing previously in the unit, where squadron commanders and officers at the regiment level did little to assist pilots in complex forms of training, was recognized to be incorrect by the instruction methods council. Now the flight commanders are carrying a full load, they are participating in training flights day and night, and they bear strict party and military responsibility for the occupational proficiency of their subordinates. This mobilizes them to successfully complete their complex tasks, and it teaches them to be independent and to think about the future. The officer always knows that he will be the first to be held repsonsible for the mistakes and omissions of his subordinates.

And so the exercise began. The warplanes taxied out to the runway pair after pair, and disappeared into the thick mist as they took off. Despite the bad weather, the crews capitalized on the terrain competently, they traveled their prescribed route undetected, and they landing at another airfield under minimum weather conditions.

The tactical situation on the ground was not simple. Utilizing surprise, the "enemy" managed to land a marine assault landing force and to occupy a beachhead on the coast. Moreover the relatively close proximity of his airfield, at which fighters were based, created an additional difficulty. They could rise at any moment to intercept the bombers.

Coordinating with artillery, the airmen had to suppress batteries on the beachhead at a strictly predetermined time and to support the beachhead's recapture by motorized rifle and tank subunits. Completion of this task would have eliminated the threat of an attack on defenders on the flank.

Analyzing the data obtained from scouts, we came to the conclusion that the batteries were concealed behind a ricky ridge on the coast, and that the antiaircraft resources were deployed mainly to repel an attack from land. In all probability the "enemy" had not yet discovered our airplanes at this airfield. The fighters could not make an attack from the sea because in comparison with the bombers, their fuel reserve was so limited.

Estimating the situation, Major B. Rubstov, a group leader and a top-class military pilot, suggested hugging the coastline at minimum altitude to the right of the beachhead, heading out to sea, turning and, performing a maneuver just before the target, attacking on the move. The command approved this variant.

The crew immediately began its preparations for the flight. Military Navigator 1st Class Captain S. Safronov plotted the route and prepared the speed tables for each section of the route. Programmer Captain P. Makshakov plotted the coordinates of the target and calculated the program for the navigation system. The order of interaction while en route and the maneuvers to be made inthe event that "enemy" fighters arise in the air were determined. The preparations for the assignment were concluded with a rehearsal and a test.

At a prescribed time after taking off and gathering together, the bomber group assumed its course to the first turning point on the route. At the calculated point, the pilots had dropped to minimum altitude. Visual orientation became difficult. They now focused their attention mainly on maintaining combat formation and the required flight parameters. The coastline and the deep blue water surface floated by beneath them. They could not go any higher: An electronic trace on radar screens would tell the "enemy" the direction in which the group was flying, and he would naturally take steps to avert the blow.

Their planes were now at their turning point. The bombers assumed their bombing run. And a little while later the sole command of the entire flight broke the air silence: "Maneuver."

Pair after pair, the airplanes climbed. Bombs away! The calculations were precise: The bombs fell in a tight group in the disposition of the "enemy" batteries. After performing an antiaircraft defense maneuver the bombers descended and assumed their course to the airfield.

Observing the actions of the airmen, the senior chief could not keep back the words of praise: "Good lads! All strikes were excellent." This was the deserved evaluation of the difficult work of pilots, navigators, engineers, technicians and soldiers of the supporting subunits.

And a few seconds later artillery struck the "enemy" positions. Fire and smoke engulfed the coast. With tank support, the motorized riflemen annihilated the assault landing force with a swift attack.

Excitement reigned at the airfield. Returning from the flight, the airmen described the unique features of working in the region of "combat activities" to their comrades, and they suggested that they should turn their attention to primarily.

The thunder of the afterburners could be heard incessantly in the surrounding countryside: More bombers were leaving for their missions. The pace of the exercise grew. On subsequent days flight commander A. Shpuk, Navigator Captain G. Kovylin and other airmen distinguished themselves. Deeply analyzing the situation and making bold and competent decisions, they were invariably successful.

The results of the exercise once again confirmed that modern combat is a complex and multifaceted phenomenon. Any forgotten detail in the preparations or in the course of a mission can have a decisive influence on the outcome of the events. To find the mistake in the "adversary's" plan, to capitalize upon it and to achieve victory with minimum expenditure of forces and resources is the main mission of a commander organizing and managing combat activities. No matter how powerful a weapon may be, there would be no success if it is used incompetently. Good morale, a psychological readiness for a difficult fight, high professional skill, thorough estimation of the situation, calculation and decisive actions are what promote successful combat.

Today, when the armament of the dueling sides is generally equal, the wisdom, knowledge and skills of commanders organizing and supporting combat acquire priority significance. Our officers always remember this. The high pitch of military training does not abate for a single minute. They learn the science of victory in the classrooms and at the practice ranges, in a situation as close to that of real combat as possible, so that they could rise to the defense of the motherland's peaceful skies at any moment.

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CRAFT IN RECONNAISSANCE TRAINING DISCUSSED

Moscow AVIATISYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 6-7

[Article by Col A. Krasnov, doctor of military sciences, professor: "Stratagem"]

[Text] Everything was ready for work at the command post. Attentively peering at the blue radar screens, the combat control officers searched for the "enemy." One of them detected a barely noticeable trace. The tiny blip was shifting in the direction of the defended objectives. Determining the nature of the target, its bearing and its range, the officer reported the information to the commander. The latter made the decision to launch a pair of fighters and to intercept and annihilate the target at a prearranged line.

Fulfilling the control commands with maximum precision, the pilots approached the target confidently. Everything proceeded as usual. The target was flying on an unchanging course and at constant speed. The combat control officer had already determined the point at which the interceptors would meet it. Just a little more, and he would hear the report of target detection by the leader.

But suddenly the direction in which the target was moving on the plotting board changed abruptly--by almost 90°. The speed of the blip increased noticeably. Where was the target going? The commander realized that the fighters would have to pursue it, and that they would have to fly a considerable distance to catch up to it. Coordination with the antiaircraft missile subunits grew more complex as well. However, the interception mission went on.

In a second episode the crew of a reconnaissance airplane--Senior Lieutenant N. Volchkov and Senior Lieutenant I. Sarantsev--did not know what the defenders would do, but they had no doubt that the ground radar stations had probably gotten a fix on their craft before they reached the "front line," meaning that fighter attacks and fire from antiaircraft resources were possible. The crew commander decided not to penetrate to the objective straight on; instead, he used one of the evasive maneuvers rehearsed previously. When the airplane got close to the intercept point calculated on the ground, the pilot turned, traveled along this line for a little while, and then assumed a new course to the reconnaissance objective.

During this time, specialists attentively tracked an airborne target at the antiaircraft command post. Maneuvering, it approached the defended objective

at high speed. Estimating the situation, the commander noted that its altitude was great, and he gave the appropriate instructions to the rocket subunit.

"I see the target," reported the operator, but immediately after that he noticed that the trace had disappeared in interference: There were failures somewhere in the control circuits. While the operators tried to tune out the interference, the target maneuvered sharply and skipped across the antiaircraft missile launching line at high speed.

The crew photographed its objectives. It had one more trial to endure. The airplane had barely assumed its return course when the onboard warning system revealed the same pair of fighters in pursuit. To foil the attack and evade a direct missile strike, the scouts utilized a previously simulated antifighter maneuver. Using their onboard apparatus and a lengthy maneuver, they managed to break away from their pursuers and get the reconnaissance information to the command on time.

A little while later a lone airborne target was once again detected by the fighter command post, but this time its trace on the radar screen appeared a little too close to the covered objectives. The "enemy" came in at minimum altitude, and it was extremely difficult to intercept him. Once again the crew of the reconnaissance airplane from that same squadron, commanded by Major V. Seregin, outfoxed the interceptors.

The tactical flying exercise continued. For a third time that day the commander had to use his brain when the trace of a group target broke in two. Traveling under the cover of a group of fighter-bombers, the reconnaissance airplane abandoned the combat formation after the fighters reached a prearranged point of climb. On the radar screens, the individual targets would suddenly be surrounded by numerous other traces, unexpectedly disappear altogether or abruptly change their direction of movement.

These three episodes of different content provide a sufficiently clear idea of the complex relationship existing between various factors governing the possibility airborne scouts have for penetrating to their objectives. Analyzing these different situations, we will attempt to clarify whether or not an airborne scout could make it through without being attacked by antiaircraft resources.

"No," a reader familiar with military affairs would answer, "a scout is under constant radar observation, and therefore it would not be difficult to create the required superiority in forces over him."

Of course, this argument is persuasive. It is very difficult and sometimes even impossible to reach a reconnaissance objective unnoticed. But stratagem can help. These examples allow us to establish, to a certain degree, a quantitative indicator of a successful stratagem. We can consider that it is successful when a scout is discovered and his flight parameters are established only after it is too late to launch fighters and antiaircraft missiles. In general, we can say that stratagem presupposes the scout's capability for fulfilling

his mission before antiaircraft resources can offer resistance, and the goal of the flight would be attained if the time from the moment the airplane is detected to the moment when it is too late to use antiaircraft resources is shorter than the time necessary for its interception. We should add to this that the more complex the aerial situation, the longer a stratagem can be effective.

As we can see from these examples, the antiaircraft forces and resources were operating in a simple situation. In real combat conditions, where aviation and antiaircraft suppression resources are used on a major scale, the situation may become so complex that it would be very difficult to determine which airplanes are ours and which are theirs.

Successful application of a new tactic has always been used as an indicator of a scout's high tactical skill. It is no accident that World War II pilots referred to tactics as a second weapon, and to stratagem as its principal element. They attached extremely important significance to camouflage, concealment and deception. They used the sun, the cloud cover, the dark side of the horizon and distractive maneuvers for this purpose. With time, the elements of stratagem underwent significant changes, but the requirements, the quantitative concepts and the laws remained as before, and they are still at the basis of today's tactics.

How can the stratagem available to the airborne scouts be defined, and what makes it more successful? First of all the pilot must be well aware of the enemy's potentials, and of the strong and weak sides of his air defenses. Turning, feinting and diversionary maneuvers, the moment of their initiation and their parameters, antiradar camouflage, concealment and deception, using strike and support groups, and penetrating in directions from which the enemy does not anticipated scouts are all based on a forecast of his actions. A scout preparing for an assignment must think not only for himself but also for the enemy. Simulating the variants of a reconnaissance flight, the crew must pose specific questions: For example, what would the enemy try to do in response to particular tactics of the scout, what would he be able to do, and what would be beyond his means?

Stratagem reflects a high level of professional skill, firm moral and psychological seasoning, caution and decisiveness, discretion and boldness, sharpness and the ability to predict the course of events. Assume for example that at a certain moment the pilot must hug the ground or complete an energetic maneuver, or quickly select a suitable tactic. Moreover, he must do all of this with the enemy constantly watching the scout and preparing his own countermaneuver. Sometimes he must patiently await an opportune moment for unhindered attainment of his objective.

Once, Captain Ye. Skopin was given the mission of reconnoitering an "enemy" airfield, the location of which he knew quite well, and establishing the number of airplanes based there. The crew reached the airfield vicinity quickly, but fighters blocked its way to the parking pads. Maneuvering, the scout evaded the fighters. Fuel was being consumed quickly, and the hope for success

diminished concurrently. The photography was very much wanted on the ground. At this moment Skopin noted a group of airplanes traveling in the direction of the airfield. Without blinking an eye, the pilot came in close to it and assumed a position behind and beneath it, where it would be more difficult to detect him. As the group began its descent for a landing, the scout turned on his cameras, passed swiftly over the runway and disappeared. Soon after, the photographs were delivered to the command.

There is also another side of stratagem. For example assume that an objective must bereconnoitered in such a way that the enemy would be unaware of the effort. Otherwise he might alter the location of the objectives, change the methods of their camouflage and concealment, reinforce his air cover or take other countermeasures. This is precisely why the number of persons participating in such measures is limited, why limitations are imposed on air and ground radio transmissions and why other steps are taken to keep the reconnaissance covert. This is why airborne scouts must know what to do to reveal the enemy without raising his suspicions.

It became known at headquarters that the "enemy" was intending to erect a crossing over a water obstacle and that he was drawing engineering equipment to the crossing point. A reconnaissance crew discovered a concentration of motor vehicles and pontoon blocks at the indicated place. Striving to obtain the fullest possible information and figuring that air defenses had not yet been organized around the objective, the scout made several passes over the objective and then transmitted a wordy message to the command post on the objective's coordinates and on details that were of secondary importance at that moment. When the time came to strike the crossing, it was discovered that the "enemy" erected it elsewhere on the river. Thus the results of reconnaissance were reduced to naught.

To keep from revealing themselves, airborne scouts usually observe objectives from great distances away, indirectly, and they utilize false maneuvers in order that the enemy would not realize that he was being subjected to reconnaissance.

Without going into the tactics, let us try to formulate a general concept of a scout's stratagem. It may be defined as his actions which mislead the enemy and force him to make wrong or untimely decisions. We can say that it is successful if the enemy is unable to deduce the reconnaissance plan and implement countermeasures before a strike is made on the objective. How do we learn to use stratagem? Much attention is devoted to crew tactical training in Major V. Seregin's squadron. During theoretical lessons and training sessons, in preflight preparations and in tactical flying exercises the commander and the pilot constantly study the enemy, create an instructuve situation, simulate different variants of a particular assignment, polish the knowledge and skills they acquired in training flights and gradually accumulate an arsenal of sensible air reconnaissance tactics.

But this does not at all mean that stratagem entails just knowledge of the adversary and a complex of ready-made models. As a rule the scout operates far away from his airfield, and often the situation is dramatically different

from what it had been conceived as on the ground. Under these conditions he would not be able to receive instructions from the commander on what to do next. Therefore initiative must be one of the foremost traits of character of the reconnaissance pilot. It entails creative use of the evolving conditions, high aggressiveness and a preparedness to assume responsibility for an independent decision.

From his rich arsenal of tactics, within seconds a resourceful scout selects those he needs right at the moment, and he successfully fulfills his mission. In every sortie, he creatively seeks something new, never repeating his actions.

During the war reconnaissance pilots never used even their favorite tactics several times in a row, since they knew stereotypy would let them down sooner or later. The tactics of air reconnaissance, as is true by the way of all tactics, do not tolerate stereotypes. A creatively thinking pilot can use various cunning tactics depending on how the situation evolves. And the task of every scout is to learn to estimate the situation quickly and accurately, and to competently utilize his knowledge and skills to unconditionally fulfill his mission.

11004
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CADET'S PRE-ACADEMY MILITARY CAREER PROFILED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) p 10

[Article by Cadet S. Kotel'nikov: "A Dream Beckons"]

[Text] Within a few months Bekbolat Izbairov, a cadet at the Kurgan Higher Military Political Aviation School, will become a political officer.

The path toward the profession he selected was not easy. On completing his 10 years of secondary education Bekbolat worked for a year as a fitter at a motor vehicle plant. Then he was called into the army. Diligent, assiduous, and an expert in his work, air mechanic 1st class Izbairov maintained a good record throughout his entire first term of service. The deputy commander for political affairs advised him to postpone his retirement into the reserves. The soldier signed up for extended service. The unit's communists showed great trust in him, accepting him for CPSU candidacy.

Actively participating in the subunit's social life, with time Bekbolat was able to define his goal clearly--to become a political worker. Senior Sergeant of Extended Service B. Izbairov did have the endowments for indoctrination work, and sizable ones at that. Communicative, principled and diligent, Bekbolat is working eagerly with people at the Kurgan Higher Military Political Aviation School, providing the assistance they need.

Izbairov understands quite well that a real political officer must not only possess a certain sum of knowledge, but he must also be able to use it practically, with the greatest benefit, in the political, military and moral indoctrination of airmen. Bekbolat does not have any special problems with his studies, he is persistently acquiring the knowledge he needs, and he has been an outstanding student throughout all of his years of study.

Since he first arrived at the school Izbairov has been participating actively in social work. He was the editor of the company wall newspaper, a member of the Komsomol Bureau, and secretary of the battalion Komsomol Committee. In his 4th year communist B. Izbairov was selected party group organizer of the class division by his comrades. He enjoys journalism. His notes and reports often appear in the school and district newspapers.

The day on which Bekbolat's dreams will come true, and a lieutenant's shoulder-boards will be placed on his shoulders, together with the high responsibility of an air force political officer is coming near.

11004
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PROPAGANDIST'S WORK TO RAISE TRAINING EFFECTIVENESS, POLITICAL AWARENESS DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3 Mar 83 (signed to press 3 Feb 83) pp 10-11

[Article by Gds Maj G. Druzhinin: "Out of Duty and Vocation"]

[Text] A dense southern twilight blanketed the ground. The work day came to an end. As always, it was hard for communist-leader Officer V. Kostinevich: There were the flying in adverse weather, the meeting of the instruction methods council, and practical work with the squadron commanders at the training complex.

Now Vladimir Grigor'yevich had to prepare a lecture for the officer Marxist-Leninist training course. He went to his bookshelf and pulled out one of the volumes of Vladimir Il'ich Lenin's "Complete Collected Works." Excerpting the necessary passages from the works of the leader, Kostinevich refreshed his memory of some of the premises of the party guidelines, reviewed the journal and newspaper articles illuminating the topic of his lecture and drew up a detailed outline. The party activist provided ample room in the outline for clear and persuasive examples and for instructive episodes from the unit's life.

Communist Kostinevich is deeply convinced that the primary sources are a highly rich arsenal, the strong ideological weapon of the propagandists. He also knows, however, that a speech would be successful only if he is able to build a bridge from theory to practice, to enrich the topic by raising currently important issues. It is with this yardstick that Vladimir Grigor'yevich approaches his preparations for every report, lecture and seminar. Many years of experience in service and in the training and indoctrination of subordinates have provided him with faithful forms and methods of ideological work aimed at shaping high ideological conviction and communist awareness in the airmen. In his activities he guides himself by decisions of the 26th CPSU Congress, by the CPSU Central Committee decree "On Further Improvement of Ideological Work and Political Indoctrination" and the deep thoughts contained in the speech given by our party's general secretary, Comrade Yu. V. Andropov at the November (1982) CPSU Central Committee Plenum and in the report he gave at the solemn meeting commemorating the 60th anniversary of the Union of Soviet Socialist Republics.

Today, the requirements imposed on a leader in general and on a military leader in particular are immeasurably greater. He must be distinguished by high party ideals, a deep knowledge of his area, a creative approach, discipline and initiative. As was noted by CPSU Central Committee Politburo member, USSR

minister of defense, Marshal of the Soviet Union D. F. Ustinov, the success of ideological, political, military and moral indoctrination of the personnel depends to a decisive degree on the regular servicemen. This means that active participation in communist indoctrination of airmen is a responsibility of all party members. They educate both through their personal example in military labor and through the inspiring words of a propagandist of the CPSU's ideals.

Officer V. Kostinevich approaches personnel training and indoctrination in the party way. Preparing for a lecture, a discussion or a political briefing, he reveals the unique features in the flight training plan and indicates the reasons behind shortcomings in the work and in disciplinary practice. He teaches people not only to fly complex modern aviation complexes and to prepare the combat equipment faultlessly for flying, but he also tempers them ideologically and teaches them to measure each of their steps up to the requirements of the Leninist party.

V. Kostinevich spoke to the ideological workers on Propagandist Day. Before discussing the tasks of combat training in the particular training period and the progress in fulfilling them, he thoroughly analyzed international events. Then the discussion turned to duty, friendship, mutual assistance and comradeship--the invariable components of the success of the collective labor of airmen. Citing examples, the party activist offered suggestions on how to organize the work so that the flight training plan would be completed with high quality.

Vladimir Grigor'yevich singled out the airmen who had distinguished themselves in the last flight shift. These were Guards officers S. Mishin, A. Dubovik, A. Mushtatov and V. Kulibaba. Kostinevich stressed that they not only operate the complex combat equipment in excellent fashion, but they also participate actively in the unit's sociopolitical life. For example Guards Captain A. Mushtatov, a master of aerial combat, a commander of an outstanding flight and a military pilot 1st class, is the secretary of a party organization of an outstanding air squadron, and he is an active efficiency expert. He is credited with eight valuable efficiency proposals. The lectures the officer gives to flight crews, engineers and technicians and the discussions he leads with them are always distinguished by profound ideological content. Also deserving of a good mention in the unit is Guards Senior Lieutenant of Technical Service V. Kulibaba, a specialist 1st class and the technician of an outstanding airplane. Kostinevich made special note of his diligence on the eve of an important tactical flying exercise in which the squadron was to fly to another airfield.

Each of Communist Kostinevich's lectures and discussions influences the mind and feelings of the soldiers, attracts attention through its logical harmony and continuity and persuades with good arguments.

Deserving of attention is the experience acquired by the group led by Vladimir Grigor'yevich in organizing and conducting lessons within the Marxist-Leninist training system. Here, each student has his own integrated plan for raising his ideological, theoretical and professional level and studying and summarizing recommended primary sources and party and government documents. Special

significance is attached to preparing reports and abstracts for seminars. As a rule these presentations deeply reveal the requirements of the CPSU Central Committee on raising combat readiness, alertness and flight safety. Based on living, concrete examples, the abstracts and reports often essentially become training aids for the soldiers, warrant officers and officers. For example the abstract "On the Leninist Principles of Controlling the Socialist Economy," given by military pilot 1st class Guards Lieutenant Colonel Yu. Petukhov at a seminar was placed at the basis of a political briefing for warrant officers. And a report on the growing role of the Leninist party in military construction in light of the requirements of the 26th CPSU Congress, and on the present international situation, given by Guards Lieutenant Colonel A. Brichikov, became a good aid to members of the agitation-propaganda collective.

Each time he meets with people--be it for a lecture or a seminar, a special lesson or a flight critique--Communist V. Kostinevich is able to discern what is most important and to utilize it for the purposes of training and indoctrinating the airmen. Analyzing the results of a group sortie flown by an outstanding air squadron, Vladimir Grigor'yevich established that some of the pilots had not maintained the required dive angle as they attacked their target. And Guards Captain Ye. Krasyuk did not perform a certain maneuver as accurately and energetically as he should have. Kostinevich indicated the shortcomings to his subordinates, and then he suggested that Guards Lieutenant Colonel V. Nedostupenko, one of the unit's best experts on instruction methods who had just returned from a flight, could he describe what should be done in similar situations. And then he himself demonstrated the most effective way to approach a target and revealed the tactics used in different situations of aerial combat. On that same day he met with flight commander Guards Captain Ye. Krasyuk. The conversation, which was concerned with military duty, responsibility for the development of young pilots, and the methods of training and indoctrinating subordinates, was a lengthy one. I must say that the young commander did gain many new and useful things from this discussion, and he went away from it with a better idea of how to work with people and how to shape high moral, political and fighting qualities in them.

The tasks facing airmen are complex and diverse. Experience shows that these tasks can be completed successfully if ideological work and political indoctrination are competently organized. Besides their competency, the teaching proficiency, theoretical preparedness and practical experience of commanders, political workers and active propagandists have a most significant influence, shaping the Marxist-Leninist philosophy of the personnel and affecting the entire process of raising the political morale, ideological maturity and combat skills of the soldiers.

Communist Officer V. Kostinevich is a leader in this important and noble effort.

11004
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LOSS OF AIR SPEED ON LANDING DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 20-22

[Article by Engr-Lt Col I. Mel'nik and Engr Capt V. Gushchin: "A Loss in Speed"]

[Text] The aircraft crew was undergoing a check flight in minimum weather. Following the fourth turn of the landing approach the crew commander began reducing speed so that the flaps could be lowered. As always, he throttled the engines down from 80 to 72 percent and gave the command to drop the flaps 20°. They dropped in synchrony, which is what the aerial gunner reported. However, the pilot did not feel the braking sensation that usually appears when the engine rpm is reduced and, moreover, after the flaps are let down. The instrument speed did not change, remaining at 390 km/hr.

The crew commander queried the navigator and his copilot for data. Their instruments also showed 390 km/hr. By this time the airplane was on its glide path, and the pilot readied the airplane for descent. The craft was flying in clouds that offered only a rare glimpse of the ground. Attempting to reduce his speed so that the flaps could be dropped 35° (to 340 km/hr), the commander reduced the engine duty to 55 percent. However, the pointer on the speedometer stubbornly rested on the "390" mark.

Once again checking against the speed readings of the navigator and copilot, which remained as before, the crew commander decreased the engine rpm a little more and reduced the vertical rate of descent to zero. The airplane was above the glide path, and as before, the ground could not be seen due to the thick blanket of clouds.

"Commander, cut your speed much more, it's time to drop your flaps to 35°," the navigator's voice came through the headphones.

"I don't understand any of this. I dropped my rpm as much as I can, and I've stopped my descent," the craft commander replied.

At this moment the landing leader informed the crew.

"Number 12, you're above the glide path."

The airplane began to shake. First a little, and then gradually the shaking intensified. The crew commander's doubt that the speed shown by the instruments was wrong transformed into a certainty when he saw that the control stick was not in its normal balanced position for a speed of 390 km/hr. The shaking continued, and the airplane began to rock from wing to wing. It was at this moment that the commander noticed that the Pitot tube heater switch was off. It all became clear: The Pitot tube had iced over. The commander immediately pulled back the control stick, increased his rpm and turned on the Pitot tube heater. In a few seconds the pointers of all of the speedometers showed 240 km/hr.

"Commander, your speed!" the navigator exclaimed.

"I've got it," the pilot replied.

He realized that the shaking and the rocking were the consequences of flying at angles of attack close to critical, such that a stall could occur at any moment.

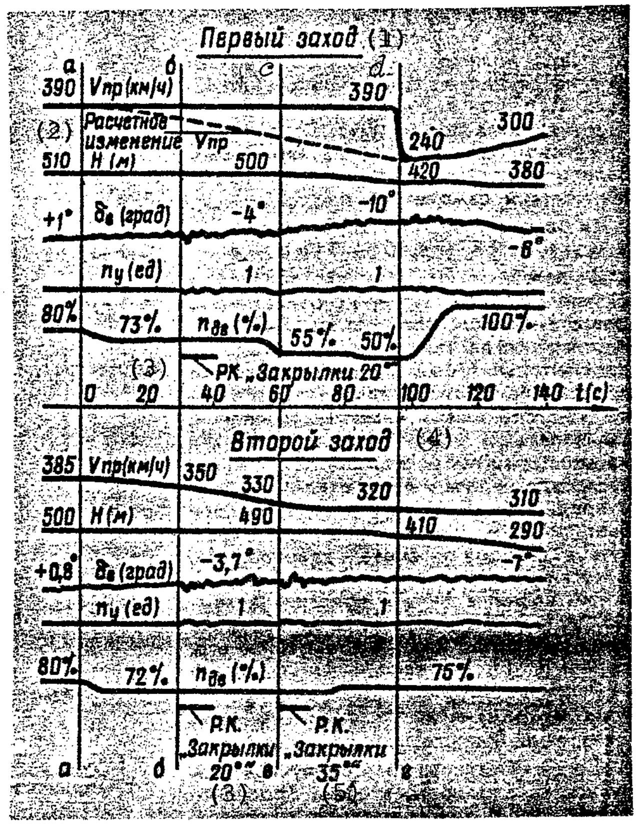
The engines were raised to maximum rpm. The pilot reported to the flight leader that he was coming around for a second approach, and to permit his airplane to accelerate more energetically he increased the vertical rate of descent. He monitored his altitude with the radio altimeter.

As the speed increased, the shaking disappeared. And when the pointer reached the 340 km/hr mark (the gliding speed for flaps set at 20°) the commander smoothly recovered the airplane from its descent and began to climb.

On their second landing approach the crewmembers attentively watched the response of the speedometer pointers to change in engine rpm. The pointers of all the instruments clearly reflected the airplane's deceleration in response to throttling of the engines, and its acceleration in response to an increase in engine rpm. Persuaded that the speedometers were operating correctly, the commander made his decision to land.

At the parking pad the specialists of the air engineer service meticulously checked out the Pitot tubes, the speedometers and the sumps of the Pitot tube system. No deviations from the established technical norms were revealed. They simultaneously analyzed analogue parameters and the commands recorded by the flight recorder during the first and second landing approaches.

The results of the analysis of the recordings of individual parameters are shown in the figure below. Comparing changes in the instrument velocity recorded by the flight recorder in both landing approaches, we can see that it is inconsistent with what the value actually was when the flaps were dropped 20° in the first approach. Thus when the engines were throttled from 80 to 72 percent in horizontal flight (*a-a*), in 30 seconds the velocity decreased from 385 to 350 km/hr (*b-b*) during the second landing approach. In the first landing approach, meanwhile, it remained constant in this same section--390 km/hr. Later, after the flaps were dropped to 20°, speed decreased to 330 km/hr in the second approach and, once again remained constant in the first approach after the flaps were dropped.



Change in Flight Recorder Parameters During Two Landing Approaches: $V_{ПР}$--instrument speed (km/hr); H--flying altitude relative to airfield (meters); δ_B--elevator position (degrees); n_y--normal acceleration (units); $n_{ДВ}$--rotation frequency of left engine rotor (rotation frequency of right engine rotor varied synchronously with that of the left) (percent).

Key:

1. First approach
2. Calculated change
3. Radio command: "Flaps 20°"
4. Second approach
5. Radio command: "Flaps 35°"

Following this, the flight recorder did record throttling of the engines to 50 percent in the first approach, but the speedometers did not react to this. The fact that the actual instrument speed continually decreased during the first approach in flight segment *a-d* indicates that the elevator was smoothly retrimmed from +1° to -10° in the pitch-up direction. In this case the retrimming was similar for segment *a-c* in the first and second approaches, which says that the instrument speed varied identically in both cases.

The actual change in instrument speed in the first landing approach was calculated for the case of an elevator in balanced position using the following formulas:

$$C_{y\,\text{г.п}} = -\frac{m_{z_0} + \delta_{\text{в бал}}\, m_z^{\delta_{\text{в}}}}{m_z^{C_y}};$$

$$V_{\text{пр}} = \sqrt{\frac{2G}{C_{y\,\text{г.п}}\,\rho_0 S}}.$$

The speed in segment *a-d* obtained by calculation is shown in the figure with a broken line.

At section *d* the recorder picked up an abrupt change in the instrument speed from 390 to 240 km/hr in the first approach. This same change in speed was also noted by the crewmembers on their indicators after the crew commander turned on the Pitot tube heater. After this in the first landing approach the flight recorder recorded an increase in engine power to maximum, growth in instrument speed and initiation of a second pass.

It should be noted that three Pitot tubes are mounted on this aircraft--two on the left side of the fuselage and one on the right. One of the Pitot tubes on the left side supports the speedometers of the crew commander and navigator and the other is a back-up. The Pitot tube on the right side supports the copilot's speedometer, the speed sensor of the onboard recorder and instruments of other systems. Inasmuch as the readings of the speedometers of all crewmembers and of the onboard recorder were the same in the first approach and did not correspond to the real value, the obvious conclusion is that all of the Pitot tubes were malfunctioning until the moment their heating system was turned on.

Thus during the landing approach, in the vicinity of the fourth turn or a little before it, all of the airplane's Pitot tubes became iced over because the heater was off. The dynamic chambers of the Pitot tubes were plugged up, and so the instrument speed shown on the indicators remained constant--390 km/hr. The Pitot-static tubes did not ice over, since according to reports from the crewmembers the altimeters and variometers showed change in altitude as the airplane flew on its descending glide path. The onboard recorder also registered normal altitude changes.

An analysis of the weather revealed that icing conditions did exist during the time of flying--high air humidity and a continuous cloud cover at circling altitude combined with a temperature of -5°C. All crews in the air turned on the de-icing systems of the engines, wings and tail. The crew of the airplane aboard which the emergency situation arose also flew with the de-icing systems turned on. But they forget about the Pitot tube heating system.

The Pitot tube heater is turned on as a rule just before the airplane takes off, and it is turned off only after the airplane lands, irrespective of the weather conditions. The crew had not turned on the Pitot tube heater prior to taking off, and this nearly resulted in a serious air accident.

The incident was thoroughly analyzed together with all of the unit's personnel. The need for strictly fulfilling all operations in preparation for take-off was

pointed out to the flight crews. The unit commander turned special attention to mandatorily, and not just formally, reading off the checklist for engine testing and take-off, and toward unconditionally fulfilling the requirements of these checklists. Herein lies the essence of guaranteed safe flying.

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COMBAT MANEUVER ON HORIZONTAL PLANE DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 21, 37

[Article: "Simulation in Flight Practice"]

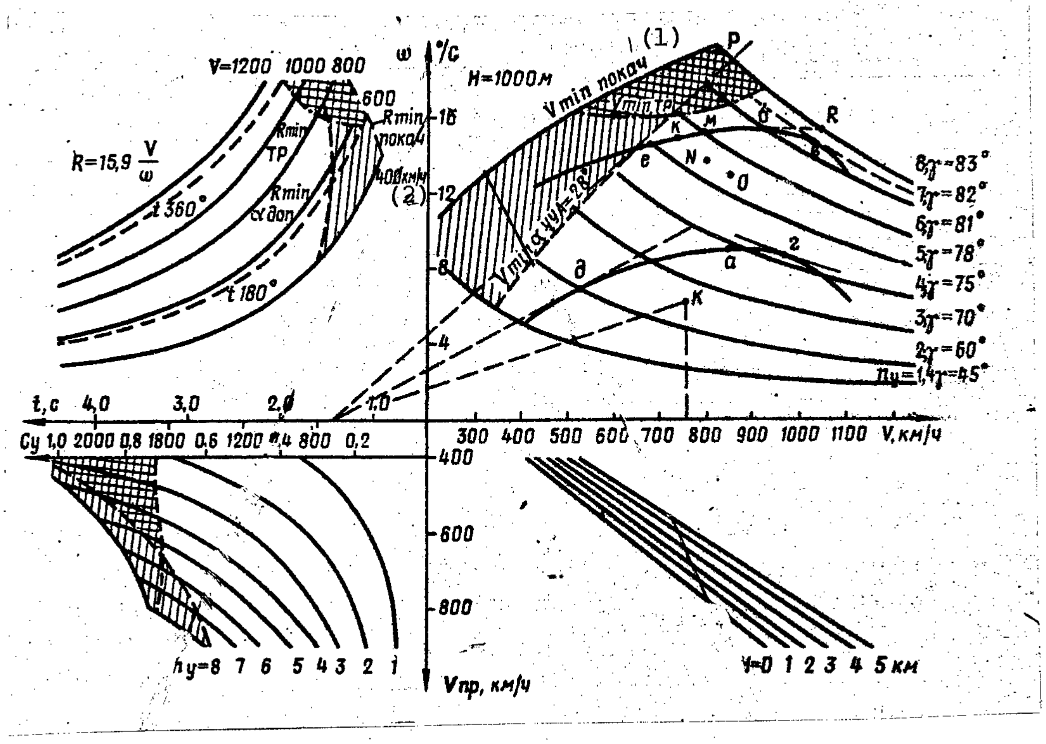
[Text] Problem No 2

Assume that you must perform a steady turn in minimum time during combat maneuver in the horizontal plane (in aerial combat, when attacking ground targets and so on). Which maneuver would you prefer, one performed at maximum acceleration (maximum bank) or maximum angular velocity (ω_{max})?

Solve the problem for an airplane with the limits of turning potential in the horizontal plane shown in the figure below. The altitude (H) is 1,000. Also determine the maneuvering conditions (engine duty, speed, bank, acceleration) that must be satisfied when performing the maneuver you find. What in this case would be the turning radius, the time of a 360° turn and the angle of attack (C_y)?

Problem Solution

It follows from the graph in the top right corner of the nomogram that the angular velocities of a turn performed with the afterburner significantly exceed the angular velocities of a turn performed at maximum operating conditions. Therefore the afterburner should be used in a combat maneuver. A steady maneuver at maximum acceleration (bank angle) is performed at engine duty determined by the points at which the curves corresponding to the limits of steady turns come in contact with the lines representing constant accelerations n_y (points в and г). The conditions for performing a maneuver at maximum angular velocity ω_{max} are determined at the points where the curve denoting the limit of steady turns comes in contact with straight lines parallel to the abscissa (points a and б). Comparison of the parameters at points б and в would show that in terms of angular velocity and radius, a turn with $n_{y_{max}}$ (γ_{max}) is inferior to a turn with ω_{max}. The maneuver parameters of interest to us (ω, R, t) performed with n_y (γ_{max} and ω_{max}) are shown in the table.



Nomogram of Areas and Limits of Performance of Turns in Horizontal Plane

Key:

1. Pokach [transliteration; abbreviation for "shaking"?]
2. km/hr

	ω°/с	n_y	$R_м$	(1) t_{360} с	V км/ч	$V_{пр}$ км/ч	(2) γград	C_y
(3) разворот с $n_{y_{max}}$ (γ_{max})	14,5	7,5	1150	25	1040	980	82 30	0,56
разворот с ω_{max}	15,3	7	980	23,5	950	900	82	0,62

Key:

1. Sec
2. Degrees
3. Turn with

As we can see, for combat maneuver it would be more suitable to make a steady turn with ω_{max} (point б), in minimum time and with the least radius, than to turn with maximum acceleration (with a maximum bank angle).

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NAVIGATION: REASON FOR DEVIATION FROM COURSE DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 22-23

[Article by Col N. Loshkarev, military navigator 1st class: "Deviation From the Route"]

[Text] The most dangerous thing is when a pilot operating an aircraft believes that he knows everything, and he does not suspect the existence of information that he must know.

When there were 50 kilometers left to the landing airfield, programmed as 4 AER, a command to halt his descent and home in at an altitude of 4,200 meters was transmitted to Captain V. Pur'yev, the pilot. The reason for this was that contrary to the forecast, the weather worsened sharply, and a landing became impossible.

The flight leader decided to send the crew to an alternate airfield 230 kilometers away. It had not been programmed into the radio navigation system of local air navigation, the RSBN-6S.

After the airplane locked onto the homing beacon, the pilot was ordered to travel at a course of 100°.

In 15 minutes of flight the airplane deviated from its course by 110 kilometers. This great deviation at the end of the transfer flight was dangerous, considering that fuel was low. Owing to prompt and efficient actions by the crew chief of the command post and the aircraft landing leader of the alternate airfield, Captain Pur'yev's craft was successfully guided into the airfield and landed.

What was the reason behind the significant deviation from the prescribed course? The answer is simple--the pilot's incompetency in using the navigation equipment, and absence of required piloting knowledge.

The transfer flight followed the route programmed in the RSBN-6S. Axis X of the great circle coordinate system used in the RSBN-6S was located in relation to the true meridian of the take-off airfield. In order that the SKV [not further identified] would show the course relative to this axis X, the magnetic declination of the take-off airfield, $\Delta M=+7°$, was fed into the KM-5 correction

mechanism, and the course was coordinated. As we know, when an airplane flies a predetermined route the SKV operates in directional gyro mode, and it shows the current great circle course relative to axis X of the coordinate system used by the RSBN-6S to perform all calculations for the flight on the preprogrammed route.

The magnetic declination set in the KM-5 prior to a flight cannot be changed by the pilot.

Captain Pur'yev attempted his landing approach to 4 AER in "Vozvrat radiynyy" [translation unknown] mode. When the RSBN-6S operates in this mode, the current and prescribed courses are calculated by the NPP [not further identified] relative to the true meridian of the landing airfield.

After receiving orders to go to the alternate airfield the pilot pressed the CLEAR button on the control panel of the RSBN-6S--that is, he turned off the "Vozvrat" mode and tuned in the working channels of the RSBN and the PRMG [homing radio beacon?] of the required unprogrammed airfield. Once again as a result, as was the case during flight on the preplanned route, the NPP calculated the OK_t--that is, the course relative to axis X passing through the true meridian of the take-off airfield.

For the programmed landing airfield the meridian convergence angle Δ was 20° (see Figure 1), the magnetic declination was $\Delta M = -15°$, and the relative magnetic declination was $\Delta M_y = -35°$. The pilot was given a magnetic course equal to 100° (when controlling crews flying from one airfield to another, the flight leader and the command post always give a magnetic course). But the pilot maintained a reading equal to the prescribed magnetic course on the current course scale, which indicated the great circle current course. Thus his course error was equal to the angle between the orientation of axis X and the orientation of the magnetic meridian of the airfield where the command post from which he received his orders was located--that is, it was equal to the relative magnetic declination $\Delta M_y = -35°$.

Had Captain Pur'yev been well versed in the airplane's navigation systems, had he prepared meticulously for the transfer flight, and had he carried, on his knee-worn map board, a table of information on alternate airfields concerning the use of RSBN, SKV, ARK [aircraft radio-compass] and ARP [automatic radio direction finder], after receiving $MK_{зад} = 100°$, he would have added to it the relative magnetic declination of the airfield from which he received the orders and, maintaining the resulting great circle course

$$OK_{зад} = MK_{зад} + \Delta M_y = 100° + (-35°) = 65°,$$

he would have reached 4 AER by the shortest route without assistance from the command post.

Let us examine another case. Performing a transfer flight, Captain V. Karev took a heading for the landing airfield and received a prescribed magnetic course from the flight leader relative to the point of initiation of his

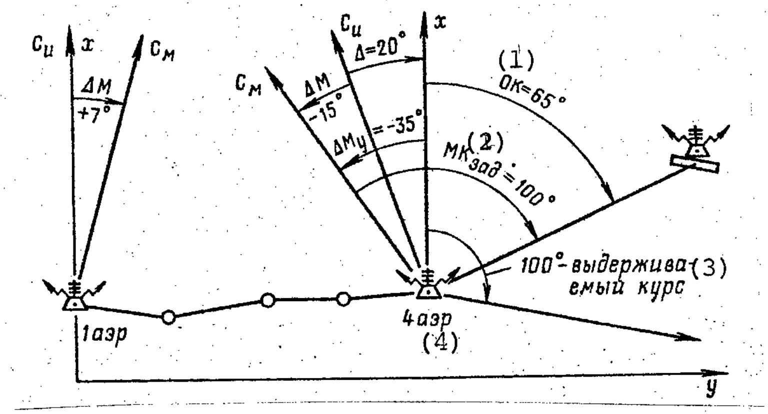

Figure 1. Determination of Great Circle Course

Key:

1. Great circle
2. Prescribed magnetic course
3. Maintained course
4. AER

calculated turn. The pilot adjusted the SKV and maintained his course with regard for the difference between the magnetic declinations of the take-off and landing airfields. As a result the airplane began to deviate from the required direction, and only the prompt interference of the landing leader prevented dangerous convergence of Captain Karev's craft with other airplanes.

What was Captain Karev's error?

After the SKV is adjusted by pressing the magnetic course adjustment button, the current course of the NPP indicates, opposite the triangular mark, a reading equal to the algebraic sum of the magnetic course given by the induction sensor through the gaging device of the correction mechanism, and the magnetic declination value set prior to the flight in the correction mechanism ($\Delta M_{takeoff\ a/f}$). Therefore if after receiving the prescribed magnetic course the pilot mistakenly adjusts the SKV, he would have to add to it the magnetic declination set in the correction mechanism prior to the flight at the take-off airfield, and he would have to maintain his course in such a way that the reading on the moving scale opposite the triangular mark on the NPP would show $MK_{зад} +$ $+ \Delta M_{takeoff\ a/f}$.

For example if in the conditions shown in Figure 1 ($\Delta M_{takeoff\ a/f}$=+7° was set in the correction mechanism at the take-off airfield prior to the flight) the pilot is given a prescribed magnetic course of 100° by the landing airfield (4 AER) and mistakenly adjusts the SKV, he would have to fly with a reading of 100° + (+7°) = 107° on the moving scale opposite the triangular mark on the NPP. In other words when the longitudinal axis of the airplane is oriented 100° relative to the magnetic meridian of 4 AER, the induction sensor gives a reading of MK=100°, and a reading of 100°+7°=107° is calculated by the NPP, with a consideration for the magnetic declination set in the correction mechanism (+7°). If we were to act as Captain Karev did, the course would be wrong, because the reading given by the current course scale of the NPP would have been calculated incorrectly.

Assume in the case shown in Figure 1 that we add, to the prescribed magnetic course ($MK_{зад} \doteq 100°$), a correction factor calculated as the difference between the magnetic declinations of the take-off and landing airfields ($\Delta M_{takeoff\ a/f} - \Delta M_{land\ a/f}$). Then the resulting reading on the current course scale used to maintain the prescribed orientation would be equal to $100°+7°-(-15°) \doteq 122°$--that is, it would be wrong. If we calculate the correction factor as the difference between the magnetic declinations of the landing and take-off airfields, it would be $\Delta M_{land\ a/f} - \Delta M_{takeoff\ a/f} = -15° - (+7°) = -22°$, and the reading on the current course scale used to maintain the prescribed orientation would be $100°+(-22°)=78°$--that is, once again it would wrong, since the correct reading is 107°.

But what if the pilot mistakenly adjusts his SKV while en route for some reason during a transfer flight, for example when passing over PPM-2 [route turning point No 2]?

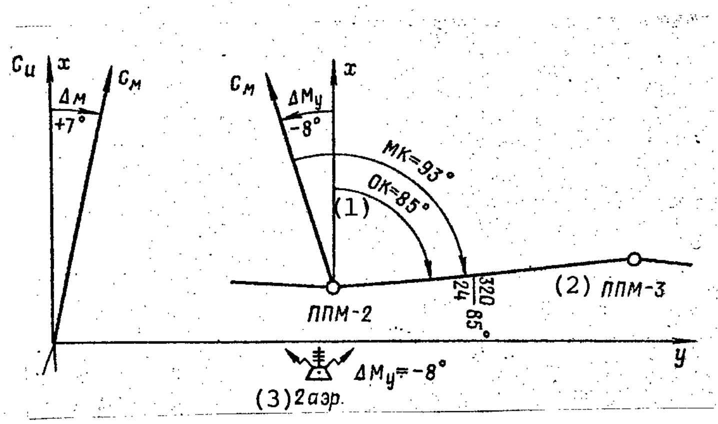

Figure 2. Determination of Magnetic Force From the OPU at M_y

Key:
1. Great circle course
2. Route turning point
3. AER

Let us analyze the case shown in Figure 2. The pilot mistakenly adjusted the SKV as he passed over PPM-2. An OPU [great circle course angle] equal to 85° is shown on the flight map for the third leg of the route, and after the SKV was adjusted, the NPP began showing an aircraft course differing from the great circle course by an unknown amount. If the pilot is to maintain a course without assistance from the command post in such a case, he must know what had been set in the correction mechanism prior to the flight, he must be aware of how the readings on the current course scale of the NPP are derived, and he must know how to calculate the reading that would allow him to maintain an accurate course relative to the great circle course angle shown on the map.

Thus when OPU=85°, a magnetic declination of +7° is set in the KM-5 and the pilot has mistakenly adjusted the SKV, to maintain the proper course in the next leg of the route he would have to reason as follows.

Were the longitudinal axis of the airplane to be oriented 85° relative to axis X (OPU=85°), the induction sensor would read some particular magnetic course. How do we determine what magnetic course it would read in the given case? This problem can be solved using Figure 2: $MK=OK-\Delta M_y=85°-(-8°)=93°$. It is difficult to determine ΔM_y for the current leg of a route while in the air, which is why the calculations should be based on the relative magnetic declination noted down on the knee-worn map board for the closest alternate airfield. (in Figure 2, $\Delta M_y=-8°$).

If the induction sensor reads MK=93° and +7° is set in the correction mechanism, the current course scale of the NPP would show 93°+7°=100°.

Thus in the case examined here, a reading of 100° would have to be maintained on the moving scale opposite the triangular mark of the NPP in this leg of the route. It should be kept in mind here that without preliminary study of the material on this issue and without prior training on the ground, it would be impossible to make these calculations in the air.

(To be concluded)

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ONBOARD MONITOR DETERMINES FUEL UTILIZATION

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) p 26

[Article by Engr-Lt Col V. Dorofeyev: "Kilograms Add Up to Tons"]

[Text] The economy must be economical. This demand laid upon all sectors of the national economy by the 26th CPSU Congress is being satisfied by the Soviet people. We know that effective economization of every ton of coal, petroleum, metal, other materials and energy may be insured only by a thrifty attitude toward the expenditure of material valuables, by their strict control, by the most rational operation of equipment and by other means. Experience has shown that desire alone is not enough. We also need to manage every effort in a business-like manner.

It was a flying day at the airfield. Everyone directly associated with aviation knows what that means: take-offs, landings, taxiing aircraft, and the roar of engines operating in the air and at the parking pad. But is it always suitable to "race" the engines on the ground?

Of course, we cannot do without all of this completely. All of it is necessary--the starting and testing of engines prior to flying, taxiing around the airfield, maneuvering onto the parking pad, undergoing inspection at the technical control post, and idling while waiting for take-off. But the idling time of engines must be strictly optimum. This can be achieved by improving flight planning and control over prompt engine starting, taxiing from the parking area and the technical post, and reducing the waiting time for permission to taxi out and take off.

Selective study and analysis of flight recorder data revealed that after engines are started, airplanes remain on the ground for 6-12 minutes prior to take-off. A total of 5-6 minutes passes between the time an airplane lands and its engine is shut off. Thus the total time an engine operates on the ground in a single flight is 11-18 minutes for fighter aircraft.

If we compare the operating time on the ground with 1 hour of flying time, the ratio would vary from 30 to 48 percent for certain kinds of airplanes in different units. This indicates that engines are working longer than required on the ground before flying. Hence follows higher fuel consumption, additional noise, pollution of the air around the airfield and added expenditure of propulsion unit life, small though it may be.

Simple calculations would show that even an insignificant reduction of the time engines are operated on the ground would produce a certain savings in fuel and in the life of propulsion units.

An analysis of the data of flight recorders such as the SARPP-12M carried by fighter aircraft of certain types revealed one of the ways of reducing the time engines are operated on the ground. This analysis was conducted selectively in relation to several airplanes possessed by different units, in one period of operation between repairs (the most recent). It was established as a result that adequate attention is not always devoted to the real time propulsion units are operated in the air, and especially on the ground. As an example for practical purposes engine operation on the ground is not fully accounted for. Many feel that since only a fifth of the ground operating time is used to calculate total engine operating time, this value could be ignored. True, this represents but 1.5-2 percent of engine life, but when an engine is allowed to idle, this can have great significance to fuel economization. After all, kilograms add up to tons.

Calculations based on flight recorder data show that reduction of the total operating time of fighter engines on the ground by just 5 minutes per flight would mean an annual savings of hundreds of tons of fuel. Let's add it up.

Assume ΔG_{econ} is the total quantity of economized fuel. Then $\Delta G_{econ}=G_{gr}N\times(t\Sigma_{av\ gr}-t_{gr\ calc})$, where G_{gr} is the average fuel consumption on the ground during taxiing, assuming 20 kg/min for our calculations; N--number of flights in the unit per year; $t\Sigma_{av\ gr}$-- average actual total engine operating time (as determined from analyzing SARPP-12M data) on the ground in one flight, obtained from a sample of several airplanes.

Let us use 15 minutes to demonstrate calculation of $t\Sigma_{av\ gr}$. We calculate $t_{gr\ calc}$ for one flight:

$$t_{gr\ calc}=t_{st\ test}+t_{taxi}+t_{insp}+t_{wait}+t_{taxi\ to\ RS},$$

where $t_{st\ test}=2.5$ min--time required by the pilot to start up and test the engine at the preparation station (refueling station) prior to flight; $t_{taxi}=$ $=L_{taxi}/V_{taxi}$--taxiing time (before and after flight). It may be adopted equal to 4.5 min; $t_{insp}=1$ min--time to inspect the airplane at the technical control station; $t_{wait}=1$ min--time waiting for take-off after inspection at the technical station; $t_{taxi\ to\ RS}=1$ min--time required to taxi to the technical control station (refueling station) and to shut off the engine.

Substituting these values, we find $t_{gr\ calc}=2.5+4.5+1+1+1=10$ min. Then $\Delta G_{econ}=$ $=20N(15-10)$--that is, $\Delta G_{econ}=100N$ (kg).

As we can see, the fuel savings can be rather sizable. For example for 7,000 flights this value would be 700 tons, while for 8,000 flights it would be 800 tons.

Thus objective analysis of flight recorder data allows us to arrive at a fuller assessment of the true operating conditions experienced by aircraft engines on

on the ground, and to economize on aviation fuel. Besides economizing on fuel and lubricants and reducing the time engines are operated on the ground, we can also reduce noise and the relative pollution of the air in the vicinity of the airfield and at the airfield itself. And this is also important to preserving our environment.

11004
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IMPORTANCE OF AIR-GROUND CONTROLLER LINK STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) p 27

[Article by Engr-Maj V. Gur'yev, official flight leader: "'Divert to Your Alternate'"]

[Text] I have been flying for over 20 years. I have served as an official flight leader for two and a half years. I had occasion to perform these responsibilities before that as well. Because of the help I had received then from experienced specialists, it was possible for me to break myself in quickly and get used to the post to which I was assigned.

During my time as a flight leader I became persuaded that successful flying is guaranteed only when all who control the crews from the ground work in unison with personnel in the air. In our unit this means primarily the commanders of transport aircraft. I can come up with many cases where efficient, competent interaction between a flight leader and a crew and their mutual understanding made it possible to complete an assignment with high quality in a complex aerial situation and adverse weather.

One would think that everyone understands the truth that the flight leader and the pilot have a main end goal in common--insuring flight safety from take-off to landing. But some pilots sometimes forget it, they exaggerate their own capabilities, and owing to this they violate the laws of flight service and the requirements of the fundamental guidelines. As a result gross errors and near-accidents arise. Let me dwell on one of them.

Having completed a difficult assignment, the crew led by Major G. Petrosyan was approaching the airfield. Everyone was aware of this. The unit commander decided to lead the aircraft in. This happened in winter, and the weather was not making it easy. Having carefully analyzed the weather situation and its forecasted changes, the command post personnel came to the conclusion that a ground fog might arise. They selected an alternate airfield 40 air minutes away where the weather was expected to be stable. Other steps were also taken to insure a normal landing.

The forecast came true: When Major Petrodyan's crew was but 30 minutes away from the runway, a message came in that the neighboring airfields were being blanketed by waves of fog. Visibility remained good only at the alternate

airfield. Fog was also beginning to form intensively near the landing airfield.

This alerted the flight leader. He queried the pilot right away:

"How much fuel do you have on board?"

"Enough for 2 hours," replied Major Petrosyan.

That was good news. It was immediately reported to the commander. He gave the orders:

"Let the crew make its approach. Make your decision for landing after the fourth turn, when you're absolutely sure that the fog will not keep it from landing normally. Otherwise, divert it to the alternate airfield: There's enough fuel, and the weather is holding there."

The transporter approached the point of the third turn. At this moment it became clear that the fog was going to cover the runway in just 2 or 3 minutes, and maybe sooner. The flight leader made the sole correct decision--diverting the crew to the alternate airfield. He immediately radioed the following command:

"Two Five Five, permission to land denied! Circle, and divert to the alternate!"

Major Petrosyan's reply was unexpected:

"But I can see the runway."

"The runway is covered with fog. Even I can't see it," the flight leader's assistant transmitted.

"The runway is out of sight, it's covered with fog. Circle and go for the alternate!" the flight leader ordered on the spot.

"The runway looks absolutely clear to me, what are you trying to do? I can see it perfectly," Petrosyan retorted.

"Do as you are ordered, Two Five Five!" the flight leader insisted.

The subsequent exchanges between the ground and the pilot proceeded as follows. Craft commander:

"Request permission to land."

Flight leader:

"Permission to land denied! Go to your al-ter-nate!"

Craft commander:

"I can see it, permission to land. You can't see it but I can."

Flight leader:

"Circle! Circle!"

Craft commander:

"I'm landing."

I had a reason for dwelling on these radio exchanges in full. This makes it easier to determine their statistics. Seven commands of prohibition, with no result!

It would not be difficult to guess the kind of landing it was. The pilot leveled off too soon as he attempted the landing: He mistook the surface of the fog, which lay three to three and a half meters above the ground, for the runway. The aircraft's drag chutes were deployed. The landing gear withstood the stress, but the tires were worn right down to the cord: The crew exceeded its normal landing distance significantly.

Luckily the incident ended as just a near-accident. The structural dependability and the strength of the aircraft equipment and the proficiency of Major Petrosyan himself saved the day. But the consequences could have been graver.

The reason for this gross error is obvious--a lack of discipline elicited by the desire to land at the home airfield at all costs, ignoring a dangerous weather phenomenon. Naturally the case of disobedience was properly assessed in the unit. Major Petrosyan was strictly punished. The incident was thoroughly analyzed in the flight critique. The unit commander categorically demanded that such a thing never happen again.

One would think that describing the gross violation of the laws of flying and the measures that were implemented in response would tell the whole story. But there is more. One is forced to ask this question: Why did an aircraft commander bearing full responsibility for the lives of people aboard and for the integrity of the craft entrusted to him take such an unjustified risk? In our case the answer is simple: On occasion, Major Petrosyan has disobeyed commands from flight leaders before, and unfortunately he sometimes got away with it. Had things been different, the grave near-accident may have been averted.

A flight leader who enters all shortcomings into his log without exceptions and who insists on their strict and fundamental assessment by the command is doing the only acceptable thing. After all, gross errors are not something inevitable. They do not arise right away, suddenly; instead, they begin with supposedly minor deviations that attract no attention. "There are no such things as minor deviations in aviation" goes a saying tested by many years of practice. We must nor forget it, since whenever we do, we jeopardize flight safety.

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EFFICIENCY OF 'BRIGADE METHOD' DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 28-29

[Article by D. Yermakov, chief, laboratory for scientific organization of labor: "Using the Brigade Method"]

[Text] The laborers of our aircraft repair enterprise accepted the decisions of the November (1982) CPSU Central Committee Plenum and the Seventh Session of the USSR Supreme Soviet as a battle program for action. They are showing great interest in studying the speech given by CPSU Central Committee general secretary, Comrade Yu. V. Andropov, and they are making practical conclusions for themselves from it. We can especially understand the party's concern for increasing the activity of the laborers and for making every Soviet citizen clearly aware of the tasks posed by the plenum and the session, and of his place in the struggle to complete them.

The collective is making a persistent search for new forms of labor organization and ways to raise the quality of preventive measures associated with servicing airplanes, lengthening their time of operation and reducing their down time. An effective effort is being made to achieve sensible use of electric power, fuel, metals and raw materials. Recently the collective has done a great deal in this regard. And without a doubt the brigade form of labor organization is playing a major role.

We had previously created brigades in those production sections in which they were required by technical necessity and in which several workers had to be concentrated together for complex technical operations.

Today we are considering the brigade form of labor organization in a mutual relationship with labor planning and standardization, wages, payment of bonuses to competition leaders and development of democratic principles in production control. Naturally this is all associated most intimately with further growth in discipline and with indoctrination of a communist attitude toward labor in the blue and white collar workers in behalf of the main goal--raising labor productivity and insuring high dependability of aviation equipment repair.

The "Basic Directions of the USSR's Economic and Social Development in 1981-1985 and in the Period to 1990," approved by the 26th CPSU Congress, state:

"The brigade form of labor organization and stimulation must become the principal form in the 11th Five-Year Plan." This is indicated in other documents as well. We took the job of creating brigades at the enterprise seriously. A great deal of organizational work was done in the collective headed by Communist V. Mironov. The specialists took part in conferences and meetings with the best workers, and they visited an exhibit on the subject at the Exhibition of the Achievements of the USSR National Economy, organized on the initiative of the AUCCTU and the State Committee for Labor and Wages. There they acquainted themselves with the brigade method. Moreover all of the enterprise's services drew up the required documents in support of economic planning: a monthly production timetable, the brigade shift quota, a statute on using the coefficient of labor participation, sample competition pledges and others.

The collectives (councils) of the production brigades were granted the right to determine, within the standards and amounts set for them, the bonuses and wages to be paid on the basis of the work results of the entire brigade, with a consideration for the actual contribution of each individual to the common effort. In other words brigades could now play a greater role in the labor collectives. This form of labor organization is sure to produce a high impact. It makes it possible to establish bonuses and wages based on the real contribution made by each worker to the common effort. The brigade is a unit in which a healthy moral climate that has a favorable influence on people and imparts to them a feeling of collectivism and faithfulness to the principle of "one for all and all for one" is maintained. The brigade nominates workers worthy of additional payments for occupational proficiency and for doubling up associated occupations, and it petitions the administration and the trade union organization to change their rank depending on the quality of their work. The winners of socialist competitions and the size of their material reward are determined in an atmosphere of high exactingness and principles.

As a result of our indoctrination effort and the organizational work we have done, 74.1 percent of the workers are now in brigades on a voluntary basis; moreover, in some subdivisions this figure is as high as 80.4 percent.

Different variants of brigade organization were once proposed. An all-union conference on this method recommended the integrated brigade as the model. How is the production process organized within it? The brigade completely manufactures an article or part, it operates on the basis of a single work order, and it is paid on the basis of the end result. In our enterprise all brigades are organized according to this principle. They are created as two types--integrated one-shift brigades that are further specialized into the manufacture of specific articles and parts, and specialized brigades. In this case we show preference for the integrated brigades. Experience indicates that they have the higher potentials for growth in labor productivity. Equipment and production gear are assigned to each brigade, and the appropriate planning and economic documents are drawn up. The monthly planning quota for the brigade is determined by the section foreman, the brigade leader and the job distributor. The timetable considers the following economic indicators: the labor-intensiveness of the program, the nomenclature of the manufactured

products, in rubles, labor productivity, the wage fund, mean monthly wages, the number of workers in the brigade, the output per unit time, losses of working time, the calendar fund of work time in hours, and the labor-intensiveness of each worker's production plan.

The monthly timetable for the brigade's work is approved by the subdivision chief. The brigade uses it to draw up its planned shift quota.

Socialist competition is an important factor of growth in labor productivity. Now that the brigade work method has been introduced, we organize socialist competition directly with the brigade in mind. Consequently the brigade members all work on the basis of a single work order, and the same indicators of growth in labor productivity, production volume, growth in product quality and economization of materials are set for each worker. The enterprise has a statute describing the order of summarizing competition results on a monthly and quarterly basis; and in addition, foremen and brigade leaders summarize competition results each day. The competition results and the accomplishments of the best producers are broadly publicized through visual agitation.

Communist A. Fateyev's subdivision displays considerable initiative and creativity in publicizing the accomplishments of the best workers. It is no accident that the brigades headed by CPSU member V. Mukhanov and by V. Parkhayev have taken prizewinning places on more than one occasion. They have been awarded bonuses, pennants and honorary certificates that are presented in a solemn situation, in the presence of all personnel.

Organizing summarization of competition results well, objectively evaluating the achievements of the best producers, noting the successes of the leaders promptly and exposing the laggards all have enormous mobilizing and educational significance, raise not only the influence socialist competition has on production, but also its influence on morale, promote greater labor discipline and help lagging workers to adopt and utilize the experience of the innovators and the best producers of the 11th Five-Year Plan. And there are many of them in the collective.

As an example Communist A. Bulychev has earned glory for his labor. He is one of the best specialists. He performs every production assignment on time, with high quality. He treasures every working minute. This production leader is constantly concerned for indoctrinating the young complement, so that it would honorably continue the noble work of its fathers, and treasure the noble title of laborer. CPSU member A. Bulychev was given the honor of raising the flag in order of the winning brigade after the results of the competition in honor of the 60th anniversary of the USSR were summarized.

We do everything we can to make the enterprise's young laborers want to keep in stride with the achievements of science and technology. It is with this purpose that we regularly conduct competitions in the brigades. Their program is complex and interesting. Preparing for them, the young workers acquaint themselves with a vast amount of technical literature and handbooks, and they seek advice from experienced foremen, engineers and technicians. This raises the technical culture of the young workers, deepens their knowledge and strengthens their feeling of pride for their occupation.

The Komsomol youth brigade headed by Komsomol member A. Tuyev also deserves kind words. It initiated an effort to economize on working time in the performance of complex production operations associated with making aviation equipment operational. The initiators of this valuable movement were Komsomol members N. Anasimov, G. Belikov, A. Komarov and others. Incidentally there are many young people at the enterprise, and therefore the Komsomol organization plays a great role. It is working with zeal, with enthusiasm. Many other initiatives have also been proposed by the active Komsomol members. Today, Komsomol members are marching in the vanguard together with communists in the competition for successful completion of the 3rd year of the 11th Five-Year Plan. Each Komsomol member is always personally concerned for the common effort.

The labor of each person in the brigade is stimulated by the coefficient of labor participation. It is a general evaluation of a worker's labor: It considers individual labor productivity, the complexity and volume of the assignments the worker performs, the amount the worker's zone of service is increased and the extent to which the worker observes labor discipline and the quality of the products he manufactures. Piece wages and all forms of collective material and moral incentives are distributed among the brigade members with a consideration for the coefficient of labor participation.

In order to achieve the greatest objectivity in determining the coefficient of labor participation, the brigades have come up with a card that reflects the production indicators of the specialist and his observance of discipline. The numerical value of the coefficient of labor participation varies within 0.5 and 1.5 units. These indicators are approved for each worker by the brigade council, and each worker is considered on his own merits. If someone violates production and labor discipline, he is given a coefficient of labor participation less than one.

The success of the work of the brigades and their microclimates depend in many ways on the working and moral qualities of their leaders. This is why the collectives of our enterprise are headed by experienced specialists with a high level of occupational training capable of creatively organizing the work of their subordinates and encouraging them to achieve the highest results with the lowest outlay of materials. Communists I. Akimkin and V. Mukhanov and Komsomol member A. Tuyev have earned a good reputation. They are objects of pride, they are held up as models, and people learn from them. Their brigades are leading the socialist competition.

The administration and the party and trade union committees of the enterprise are constantly concerned for raising the qualifications of the brigade leaders and improving their ideological and political maturity. We have organized courses to improve the occupational proficiency of brigade leaders. Leading specialists are invited to conduct the lessons. This produces good results and helps the collective to successfully complete the complex, important tasks imposed by the air force command and associated with keeping aviation equipment in constant combat readiness. Owing to the introduction of the brigade work method, just last year alone the enterprise enjoyed a significant economic return, and labor productivity climbed by 2.3 percent.

The effort to introduce and improve the brigade method of labor organization is continuing. It is proceeding in light of the directives of the 26th CPSU Congress and the November (1982) CPSU Central Committee Plenum.

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NOTICES FOR AIR FORCE SCHOOLS PUBLISHED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) p 28

[Article: "Invitation From Air Force Institutions of Higher Education"]

[Text] Continued from No 2.

Yeysk Higher Military Aviation School of Pilots imeni Twice-Awarded Hero of the Soviet Union USSR Pilot-Cosmonaut V. M. Komarov (353660, Yeysk, 7, Krasnodar Kray)

Kharkov Order of the Red Star Higher Military Aviation School for Pilots imeni Twice-Awarded Hero of the Soviet Union S. I. Gritsevets (310028, Kharkov, 28).

Kurgan Higher Military Political Aviation School (640025, Kurgan, 25, Kurgan Oblast).

Kiev Higher Air Engineering School (252043, Kiev, 43).

Irkutsk Order of the Red Star Higher Aviation Engineering School imeni 50-Letiye VLKSM (664036, Irkutsk, 36).

(To be concluded)

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ONBOARD SAFETY INDICATORS MENTIONED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 30-31

[Article by Lt Gen Avn P. Bazanov, Hero of the Soviet Union, USSR Distinguished Military Pilot: "The Pilot's Onboard Assistants"]

[Text] Three months of the new training year have passed. They were characterized by a persistent struggle of the personnel of air units and subunits for raising the fighting power of the air force and for flight safety. Fulfilling the decisions of the 26th CPSU Congress and the November (1982) Plenum of the CPSU Central Committee, and implementing the premises and conclusions contained in speeches by CPSU Central Committee general secretary, Comrade Yu. V. Andropov at the plenum and the joint solemn session of the CPSU Central Committee, the USSR Supreme Soviet and the RSFSR Supreme Soviet dedicated to the 60th Anniversary of the Union of Soviet Socialist Republics, the commanders, the political workers, staff and service officers, the party and Komsomol organizations and all soldiers have done a great deal to utilize training time with the greatest payoff.

The aerial skills of the personnel and the special training of those who prepare the airplanes and helicopters for flying, who manage the work of the crews in the sky and who support it are constantly growing.

The results of coordinated, purposeful labor are obvious. Many fighting collectives have achieved certain successes, and they have made a step forward in the socialist competition proceeding with the slogan "Raise alertness, dependably insure the motherland's security!". The successes of the leaders were to be expected. The training process is organized and conducted in the units on a scientific basis. Every flying shift, lesson and training session maximally promotes attainment of a high end result--growth in the combat readiness and battleworthiness of the crews and subunits and of entire regiments. The command and the party and Komsomol organizations of the units are decisively fighting against even the slightest laxity and simplifications. One of the most important factors of confident movement of the best workers towards their goal is the competent use of the latest systems and instruments with which airplanes and helicopters are now outfitted, to include resources intended to insure flight safety.

"If the individual wants to become a real air warrior today," said Chief Marshal of Aviation P. S. Kutakhov, the air force commander in chief, "he must not only confidently pilot his aircraft at its peak performance day and night, in simple and adverse weather and at all altitudes, but he must also understand the physical meaning behind the phenomena occurring in flight, he must competently and correctly operate the electronic and automated piloting, navigation, target search and all of the weapon operating systems, and he must strike his objectives expertly, without missing...."

Aircraft designers have made the effort to ease the difficult labor of the air warrior to the greatest possible extent. He is now aided by various onboard automated systems. Important among them are devices that insure piloting accuracy in the critical times of flight, especially when operating at low and minimum altitudes, day and night in adverse weather. Their competent and timely use significantly expands the pilot's possibilities for completing his combat training missions and raises flight safety. At the same time this imposes new requirements on the occupational training of the air warrior.

An analysis of flying experience would persuasively show that he who possesses deep specialized knowledge and firm occupational habits, and he who is morally, psychologically and physically fit makes better decisions faster, and then carries them out just as efficiently. Such pilots utilize the onboard flight safety resources promptly and competently. These resources include the system that keeps the airplane horizontal, the system that warns of and steers the airplane away from a dangerous altitude, the active angle of attack limiting system, the systems providing sound, light and verbal warnings of dangerous operating conditions and others. Let me cite the following facts.

Lieutenant K. Zinov'yev, a young pilot, was flying a preplanned route during the day in adverse weather. As he climbed in an attempt to get out of the clounds quicker, he energetically increased his angle of pitch. His speed dropped sharply, and the airplane assumed a sizable angle of attack. The angle of attack limiting system went into action. The pilot responded without confusion: He reduced his angle of climb, increased his speed and completed his flight favorably.

Here is another example. Flight commander Major I. Moroz was coming in for a landing at night through cloud cover at an unfamiliar airfield. The instrument altitude was 600 meters, and the distance to the landing strip was 18 kilometers. At this moment the sound and light warning systems indicating a dangerous altitude came into play. The pilot immediately leveled the airplane out and reported to the flight leader. The reason behind the early descent onto the landing course was simple--Officer Moroz had incorrectly set the actual air pressure at the landing airfield on his altimeter.

Both Moroz and Zinov'yev made mistakes which were subsequently analyzed in detail. The pilots were given concrete recommendations, and I think that they did learn instructive lessons for the future. But if we consider the incidents from the standpoint of the end result of the flights, the actions taken by Moroz and Zinov'yev would have to be assessed as absolutely correct.

Examples of a different order are also encountered in daily life. Some pilots incompetently utilize the onboard resources for insuring flight safety in both ordinary and complex flight situations. This always harbors rather dangerous consequences.

Once while intercepting an airborne target at night in the clouds, Captain S. Radchenko turned his fighter toward the target a little too energetically, and he lost his orientation in space. His speed increased quickly, and his altitude decreased dramatically. After breaking through the clouds, bright lights resembling stars appeared above the pilot's head. Radchenko realized that his airplane was upside-down, and that these were not stars but lights from population centers. He recovered from his roll, and then he pulled the control stick toward himself so energetically that he blacked out for a moment owing to the improbable tension and acceleration.

The fighter recovered from its dive at minimum altitude, at greater than permissible acceleration. But in that situation all the pilot would have had to do was to turn on the automatic aircraft leveling system at the moment he lost his orientation, and the craft would have come out of its difficult situation automatically. However, in view of his poor theoretical training and the absence of the habits of using this system, Radchenko became confused and completely forgot that it existed aboard.

Inadequate knowledge of the airplane's equipment could be the only explanation for the situation that once befell upon another rather experienced pilot. During a bomb run at night he failed to set his monitor for the minimum safe flying altitude above the practice range, and while searching for the ground target he became distracted, descending to an impermissibly low altitude. This need not have happened, had the officer acted as required by the guidelines. Only the timely intervention of the flight leader prevented a flying accident.

In the struggle to prevent flying accidents and near-accidents, we must lay primary emphasis on high-quality training of the airmen, on instilling the strictest possible diligence, punctuality and high personal responsibility for unswerving compliance with the requirements of the guidelines. We must develop their ability to make maximum use of the possibilities of all technical resources carried by modern airplanes to insure flight safety. In view of the unique features of their work, those who control combat and transport airplanes and helicopters in the sky must always be ready to act quickly and competently in complex, unexpected situations.

In the best air units these highly important issues are considered throughout the entire complex of commander training. They are resolved well in the regiments in which Guards Lieutenant Colonel A. Bokach, Major Yu. Sviridov and Senior Lieutenant Yu. Samokhvalov serve. The pilots of these and other fighting collectives have come out the winners from complex situations many times.

What makes them successful? Studying the aviation equipment and armament with the personnel, the commanders and chiefs organize and conduct the lessons in such a way that the pilots would gain a clear idea of the physical foundations and principles of operation of the aircraft systems and instruments most important

to high-quality piloting and combat application. In other words the training is characterized by a clearly expressed orientation toward practical use. A well equipped material-technical base satisfying modern requirements is utilized in the lessons.

The units are outfitted with electrified stands, and they have created visual aids reflecting the sequence of actions for recovering an airplane from a complex situation using the onboard flight safety support resources. Other diagrams show the way attention is distributed and switched in instrument piloting using sophisticated display systems. The personnel attentively acquaint themselves with all of the special documents that come into the unit , and they discuss information on development of aviation published in the military-technical literature.

Regular training having the purpose of imparting and reinforcing the habits of recovering aircraft from complex situations makes it possible for air warriors to complete their planned assignments with high quality. All of this is done with integrated and specialized trainers and with simulators. Increasingly greater attention is being devoted to practical pilot training, exercises at his work station and piloting with a covered cockpit.

Before performing their assignments, the flight crews of the units in which officers Bokach, Sviridov and Samokhvalov serve receive clear instructions on the use of onboard flight safety support resources. This is one of the important directions in the struggle for unswerving compliance with the requirements of the guidelines. Flight recorder data are invariably used to analyze pilot errors. The air warriors firmly know the typical characteristics of possible failures of airplane systems and the order of their responses. Shortcomings are regularly discussed at meetings of the teaching methods councils, where recommendations on preventing them in the future are developed. And all of the best is efficiently generalized and persistently introduced into practice.

Unfortunately, things are not like this everywhere. In the units in which Captain V. Safayev and Lieutenant A. Kondrat'yev serve the onboard flight safety support resources are still being used inadequately. The main reason for this is understatement of their role and significance. A consequence of this is gross errors in training methods and in psychophysiological preparation of the pilots--irregular use of trainers, rare testing of the ability to use the resources available aboard an airplane for recovering from a complex situation and so on. Such mistakes must be corrected decisively and promptly. Only in this way will airmen be able to successfully complete all missions posed to them by the party, the government and the USSR minister of defense. We not only can but also must fly without air accidents and near-accidents.

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U.S. SPACE SHUTTLE AND SPACE LAW DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 36-37

[Article by Candidate of Legal Sciences A. Rudev: "The 'Space Shuttle' and Space Law"]

> [Text] Readers ask the following question in the numerous letters mailed to the editor: Are the Pentagon's plans for using the space shuttle for military purposes not in conflict with the fundamental principles of international space law? The article published below is an answer to this question.

The ruling circles of the USA view space as one of the theaters of military operations. In this case they are devoting greater attention to implementing the space shuttle program, which was subordinated to the Pentagon's interests right from the start. The shuttle craft are viewed as a sort of universal catalyst called upon to accelerate attainment of military-strategic superiority for the USA in space. The Pentagon intends to use them for reconnaissance, to inspect objects in space, to test the equipment of military artificial earth satellites and new kinds of weapons, as a command post and so on. Nor is the possibility excluded for transforming them into space bombers--carriers of nuclear or other weapons. According to reports in the foreign press the USA is now intensively developing laser weapons to be based in space; the plans are to demonstrate their potentials from aboard the space shuttle.

Practical implementation of such plans by the American war machine will doubtlessly result in the spread of the arms race to outer space, and it will create a serious threat to peace and the security of nations. But even today, as the flights of the first shuttle craft have shown, they affect many vitally important interests of the nations. In this connection the problem of international legal regulation of the use of space objects of this sort acquired exceptionally important significance.

The fundamental principles of international law, including the UN Charter, which remain effective irrespective of the sphere and form of activity, the technical resources used and other factors, and the fundamental provisions of

international space law documented in the 1967 Outer Space Treaty* and developed further and made concrete in other international documents on space law are applicable to the relations arising between states in the use of space objects of this sort, including the space shuttle.

The Outer Space Treaty, which documents the responsibilities of states participating in the exploration and exploitation of outer space for peaceful purposes, completely prohibits militarization of the moon and other celestial bodies (Article IV). But this does not mean that no weapons at all can be placed in outer space. Launching nuclear and other forms of mass destruction weapons into earth's orbit is the only thing that is prohibited. The prohibition does not extend to all other forms of weapons, including ray weapons. The flight of intercontinental ballistic missiles and other suborbital objects carrying any kind of weapons is not prohibited, inasmuch as they do not fall within the definition of a "space vehicle."

The technical possibilities of the shuttle craft, according to the press, permit it to invade the airspace of other states. The boundary between airspace and outer space has not yet been determined by treaty. Therefore this issue is still highly acute.

According to foreign press reports the USA plans to capitalize on the maneuvering possibilities of shuttle craft and space tugs not only to service its satellites but also to inspect the spacecraft of other states. This does not exclude the possibility of damaging or destroying them, or "kicking" them out of orbit. Of interest in this connection is the interpretation given by some Western specialists to the law of access to or visitation of the space vehicles of other countries. In fact, Article XII makes a reference to the right of visiting space vehicles, but only in the event that they are on celestial bodies. The legal grounds for gaining access to such vehicles must be the permission of the state of registry for such access or visitation. After all, Article VIII clearly states that space vehicles are under the jurisdiction and control of the state of registry irrespective of whether they are presently functioning or they have fulfilled their intended purpose.

The first flights of the space shuttle showed that preventing damage to the environment is a problem requiring immediate solution. It became clear, for example, that a sonic boom occurs when the orbiting stage is launched into space and when it returns to earth. Of course, by changing the launching and re-entry conditions the developers managed to somewhat reduce the consequences of the shock wave above U.S. territory. But what are its effects over other states and basins of the World Ocean?

Serious apprehensions have also been stated concerning the harmful influence the combustion products of the solid-fuel rocket engines of the first stage have upon the environment. Were the space shuttle program to be conducted

* Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies.

on a large scale, this may have an unfavorable influence on the climate of our planet. After all, about 300 tons of aluminum oxide powder are dumped into the upper layers of the atmosphere with every launch. This powder promotes intense formation of ice crystals in cirrocumulus and, consequently, heightened reflection of sunlight, which carries the threat of causing a general change in the temperature of the environment.

Moreover when the frequency of flights exceeds a certain amount (85 per year in the opinion of a special commission of the U.S. Congress), the ozone layer, which protects all life on earth from deadly ultraviolet emissions, may experience growing depletion with catastrophic consequences. Solid-fuel boosters must be replaced. However, this problem has not yet been solved. Development of new engines would require about $1.5 billion, and NASA can only promise to consider their use in improved models of the space shuttle system.

The Pentagon plans to use the space shuttle system to conduct a large number of experiments. It is making no comments on the content of many of them. What does the treaty have to say about this?

According to Article IX participating states are obligated to display special caution in relation to conducting experiments in outer space which may interfere with the activities of other states or have a harmful influence upon the earth's environment. Despite certain shortcomings of these provisions (their facultative nature, absence of precise indications as to when to undertake consultations, who is to participate in them, the procedures to be followed in such consultations, and their concrete international legal consequences), they do have fundamental significance to preventing potentially harmful influences that operation of the space shuttle system may have.

Thus considering the unique features of the launching and the recovery of shuttle craft, and their planned use for military purposes, it may be concluded that various aspects of their legal status must be developed. This is particularly true of insuring their safety.

The first step has already been made in this direction. A Soviet draft treaty prohibiting the placement of all weapons in outer space, submitted to the 36th Session of the UN General Assembly in August 1981, contains a number of provisions dealing directly with the space shuttle. Thus Article I of this document prohibits participating states from placing vehicles carrying weapons of any sort in earth orbit, installing such weapons on celestial bodies or placing them in outer space by any other means, including aboard manned reusable spacecraft of existing types and other types that may arise in the future. Article II of the draft foresees that participating states will use space vehicles in strict compliance with international law, including the UN Charter in the interests of maintaining international peace and security, and developing international cooperation and mutual understanding.

The Soviet draft treaty prohibiting placement of any kind of weapons in outer space has been submitted for examination to the disarmament committee in Geneva, and it provides a good foundation for negotiations.

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WORK OF MISSILE SPECIALISTS DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) p 40

[Article by Lt Col G. Spiridonov: "The Missiles are Ready for Launching"]

> [Text] The long-range aviation subunits commanded by officers G. Porakhnovets, M. Bibanin and V. Bogoslov have been announced the winners of the socialist competition, and they have been awarded honorary certificates and perpetual prizes. The way the airmen are completing their tasks and the way armament specialists are utilizing the accumulated experience are discussed below.

As a rule, engineer service subunits that deal with armament are staffed with the most experienced officer specialists. The soldiers work according to approved plans and schedules, periodically testing the apparatus and performing adjustment, repair and restoration jobs. The aircraft missiles they service are intricate complexes equipped with automatic systems and with programmed and other devices. It is not a simple thing to keep them in good order, in constant readiness for use, especially now, in winter. Higher humidity, temperature variations, gusty winds and snowfall have an unfavorable influence on the seals of the systems and the contacts. This requires special attention and persistence from the airmen.

Specialists of the armament engineer service headed by Major of Technical Service G. Porakhnovets perform their jobs in difficult conditions. Sunny weather holds for less than 2 months out of the year here, with rain or snow falling the rest of the time. Humidity often attains 90 percent.

Officers G. Porakhnovets, G. Kokaurov, S. Mukhovnikov, Yu. Tamonkin and others make sure that the armament would operate trouble-free under these conditions. Original trainers, stands and panels used to teach specialists of the air engineer service were designed under their guidance. Pilots and navigators eagerly use them during independent study. In the hangar where the main tests and adjustments are made, and where lessons are conducted in the event that flights are postponed due to weather, there are electronic diagrams showing the work of the systems and the design and operating features of the parts in all stages, from the preparations to the launching of missiles. Operating

machine units joined together by "traveling wave" electric circuits are here as well. The lesson leader can accelerate or decelerate the rate at which the "current" travels as necessary to repeat the most important points of his lecture. These visual aids help the students deeply assimilate the material.

Equipment permitting simultaneous drying of several blocks of apparatus and its aging under power and on vibrating stands is installed in many of the production rooms. This was the area of concern of the efficiency experts.

Updating the training material base, the subordinates of Engineer-Major A. Tikhonyuk set up additional racks next to the stands to store demonstration units containing characteristic faults. Now each person can refresh his memory of the causes of defects and go over the rules of working with the apparatus at a convenient time, especially before doing a difficult job.

The following tradition has been around a long time in this collective. Whenever a hard-to-correct malfunction arises, specialists immediately publish a flash bulletin concerning it, irrespective of the group that discovers it. The specialists describe the clues of the defect, and when necessary they attach a drawing or a picture. During a technical critique qualified specialists such as officers V. Bogoslov, L. Slepnev and S. Nikolayenko offer recommendations on preventing malfunctions both in the shop and in the field, and when working at a winter airfield.

A dispatch control system similar to that used in regiment technical maintenance units is employed at permanent deployment sites in order to hasten preparation of missiles for use. Back-up ground equipment is placed into operation as well. Thus in one subunit I was acquainted with a system of supplementary electric loaders--hoists--that significantly facilitates the placement of articles in the proper order on the missile preparation line. In another subunit the specialists prefer using mechanical rather than electric stackers, inasmuch as in a tactical flying exercise an umpire might introduce a power circuit failure as a scenario input.

Which method is more effective? Time will tell. But it should be noted that both subunits are working within the standards. This is possible owing to expansion of the area allowed for maneuver of the special motor transport intended to carry missiles. This makes avoidance of traffic jams following abundant snowfall possible.

And what is it like in the field, away from the main base, where the quantity of equipment and ground resources is strictly limited? Specialists have prepared for this as well. Senior lieutenants of technical service S. Mukhovnikov, A. Khrushkikh and other innovators have modernized the mobile emergency power plant, a part handling bench and an automatic warning console. The subordinates of Captain of Technical Service G. Kokaurov equipped a console to check out autopilots, thus expanding the range of tests that could be conducted in the field. There are unique testing units that are used integrally by specialists of all groups.

Mistakes of some sort are fully possible during training. The subordinates of Senior Lieutenant of Technical Service V. Nistratov violated the job sequence in an effort to reduce work time. The people developed the wrong habits. They failed to show adequate exactingness toward themselves, and they performed the operations mechanically, relying on previously acquired experience. Thus the course of the training had to be altered. Demonstration lessons have proven themselves well. In them, two of the most experienced crews compete with each other. But the lesson leader also encourages the rest of the soldiers to participate in the work actively as well.

Publicity on the combat traditions of the regiment and demonstration of the heroic work of pilots and air specialists in the war, and of the achievements of the present generation of airmen, occupy an important place in the activities of the executives and the party and Komsomol organizations. Guards Engineer-Senior Lieutenant A. Grigor'yev, Senior Lieutenant of Technical Service S. Fateyev and other communist officers inspire their subordinates by personal example to attain new summits in the competition, and they persistently introduce the best experience. In recent years the flight crews have never performed a single inaccurate missile launch. Over 70 percent of the personnel are outstanding soldiers. All groups and 80 percent of the crews are outstanding.

The collectives of the service are living a hard life today. Together with all of the Soviet people and soldiers of the armed forces, they are preparing for an honorable welcome to a noteworthy day--the 80th anniversary of the Communist Party of the Soviet Union. Engineers, technicians and mechanics are utilizing all of their possibilities to prepare aviation armament for combat use with high quality.

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PSYCHOLOGY OF FLIGHT DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 42-43

[Article by Lt Gen Med Serv N. Rudnyy, doctor of medical sciences, professor: "Psychology of Flight Labor"]

[Text] About 8 decades have passed since the first flight of an airplane. Since that time, tremendous changes have occurred in aviation. However, man continues to play the main role. The words of N. Zhukovskiy are even pertinent today: Flying is not at all for everyone; such a person must have a very large attention span, all of his movements must be coordinated, and he must be resourceful and self-controlled. This thought has acquired especially deep meaning today, inasmuch as it pertains not only to pilots but also to engineers and technicians, whose work has also undergone significant changes.

And in fact, dependable control of an airplane and its competent operation on the ground and in the air depend on certain habits of military airmen and on close interaction of their psychological and physiological functions. That these qualities are so diverse in every person attests to the extremely intricate relationship existing among the processes occurring in the body. We will examine some of them in the series of articles offered to the reader below.

Why You Need to Know Psychology

Once in the evening after flying, two young officers were talking about theoretical training for pilots.

"We're studying aerodynamics, that's understandable, but what do we need psychology for?" one of the lieutenants wondered.

The question as to why psychology should be studied is far from an idle one: Flying is one of the most complex professions. It imposes high requirements on air warriors, with a consideration for the unique features of their

character and their spiritual countenance. And it is not easy to illuminate the problems of psychology--all the more so from the standpoint of their relationship to the daily life of airmen. Many look at psychological phenomena as something abstract; moreover they are frequently simply ignored or disbelieved. This is true, for example, in relation to the importance of emotional manifestations and the possibilities of their unfavorable influence. But we must deal with psychological factors everywhere, and psychology plays a role at all times and in all things, even when it seems to have no bearing at all. Man does not live in isolation from his environment. He constantly comes in contact with various factors, both biological and social.

We know that each of us has certain defense mechanisms inherent to us that keep us from getting sick and allow the body to endure extreme conditions. An example of such defense mechanisms is an inborn or acquired resistance to certain microbes, bacteria and other agents that elicit infectious diseases. This is what is known as biological immunity.

But does the body have defense mechanisms against the influences of the outside world, and primarily those of social factors? Sadness and joy, failure and success, unhappiness in the family, in the service or at work, disenchantment and failures are perceived by the individual, and doubtlessly they have a great influence upon his mind. In this century of swift scientific-technical progress and colossal socioeconomic transformations, the role of the mental factor has significantly increased in all spheres of life. Arisal of new and improved forms of equipment, the greater speeds at which various equipment operates and the enormous volume of information to which the individual is exposed also influence his mind.

While in former times psychological and emotional trauma had its causes mainly in personal relationships between people, now its causes can also be found in professional activity. Labor is undergoing an intensive process of intellectualization today. This pertains first of all to flying. After all, concurrently with the decrease in the overall physical load imposed upon the body, the elements of mental activity are now acquiring increasingly greater significance, the responsibility of the individual for the work he does is rising, and the influence of negative psychological and emotional factors is increasing. All of this taken together imposes high requirements upon the individual's internal resources, among which mental health and emotional balance are important components.

Examining the possibility of adapting the human mind to the environment, the great Russian physiologists I. P. Pavlov credited mechanical immunity with a large role. By this term he meant the great possibilities inherent to higher nervous activity and to the human mind.

Various nervous processes and their properties, which take the form of thoughts and feelings in the human mind, assumed the role of protective mechanisms in the reaction of mechanical immunity. Psychological defenses essentially make themselves known in the broad possibilities available to the personality for altering itself with the purpose of achieving the most economical and effective

forms of adaptation of vital activities to concrete situations, and insuring defense against harmful circumstances at the needed moment.

Soviet and world science has accumulated many recommendations that help to achieve fuller utilization of the possibilities of the mind, all the more so because man's entire life is continually accompanied by a process of self-education, self-improvement and self-correction, even though we usually never turn attention to this process in our day-to-day lives. But study, work and communication always involve an educational influence upon people, which promotes formation of certain thoughts and feelings within them, and this reflects upon their consciousness--the highest manifestation of man's mental activity. Consciousness forms in the course of social development, and its characteristics are determined by the diversity of the natural and social conditions of each person's life.

And so, why should each of us know something about psychology? It provides a possibility for using the mind more fully to form and improve the self, and the norms of behavior and activity developed through life experience help the individual to surmount various adversities and shocks. Sometimes even psychological knowledge that remains passively locked in the brain is enough for an individual to correctly deal with his experiences, to control his behavior and to honorably emerge from a complex situation.

After all, each of us has the qualities we need to protect ourselves from various mental influences. These include, first of all, healthy social feelings, conscience, intolerance of moral deviations, and spiritual richness, all formed in the course of political and military indoctrination.

And now let's talk about the pilot's profession. As we know, a pilot's training involves the study of aerodynamics, physics, mathematics, aviation equipment, tactics and so on. These disciplines are fundamental to the professional activities of an air warrior. But it has become obvious today that this knowledge is no longer enough to form a competent and courageous pilot. A knowledge of psychology has become necessary as well. Now it is very important to make practical use of the laws and recommendations of psychological science in the training of flight crews.

Psychology helps every airman to better reveal his strong and weak sides and the most effective ways of nurturing will, persistence, initiative and other high moral and fighting qualities. At the same time, a deep knowledge of the psychology of their subordinates permits commanders and chiefs to learn more about their interests and moods, to deeply analyze their progress in the flight program, to reveal the causes behind mistakes made in the air and to develop concrete preventive measures by which to eliminate the discovered shortcomings. This is why consideration of psychological factors in flight crew training is one of the important prerequisites of the successful activity of commanders, political workers, engineers and flight surgeons.

We must caution against taking an incorrect approach to using psychological knowledge. Dogmatism in psychology is highly dangerous, inasmuch as he who uses the theory without concrete grounds will unavoidably come in conflict

with reality. We know that two persons cannot perform the same job in the same way. This is why experienced leaders consider the concrete situation, the possibilities for completing a given job and the individual psychological features of their subordinates.

It was believed at the dawn of aviation that any person without any sort of significant physical flaws can become a pilot. Very soon, however, life refuted this opinion. It was persuasively demonstrated at the cost of many unfortunate incidents that far from all individuals, even those with excellent health, are capable of successfully controlling an aircraft.

It was at that time that flying posed a number of new tasks before a new direction of science--aviation medecine. One of them--selecting pilot candidates--continues to be important today. It is no accident that it was noted at a recent international congress of aviation medicine that no other form of professional education requires greater outlays than does the education of a pilot.

The requirements imposed on pilot candidates are constantly increasing as scientific-technical progress occurs in aviation. We can say quite definitely today that there is a clearly expressed dependence between mastery of flying and the effectiveness with which combat equipment is used on one hand, and the individual qualities of the air warrior on the other. This is why a candidate wishing to enter a military aviation school for pilots undergoes not only a meticulous medical examination but also an extensive psychological analysis, the task of which is to determine the persons in relation to whom gradiation from the given school is doubtful and weed them out beforehand, prior to the start of training.

Physicians turn persistent attention to the individual psychological qualities of the applicant and, in particular, to the capabilities needed for successful mastery of the profession of flying. Moreover because new airplanes and helicopters of various designs and purposes are coming into being, the issue of achieving greater differentiation in candidate selection with a consideration for the needs of the different branches of aviation has become very serious.

In addition to carefully testing vision, hearing, memory and thinking, medicine devotes a great deal of attention to the mental properties of the personality and the temperament of the applicant. Investigation of the interests and the orientation of the future pilot and the motives encouraging him to voluntarily commit his life to aviation is now given a special place in evalutation of the candidate's mental properties. In this connection great significance is attached to determining the personality qualities beneficial to flight training--decisiveness, aggressiveness, high motivation and others.

An example of purposefulness in mastering the flying profession can be found in twice-awarded Hero of the Soviet Union Major General of Aviation (Reserve) A. Molodchiy. He acquired his initial information on aviation in an airplane modeling circle of the Pioneer Palace of the city of Donetsk, while he was in fifth grade. Under the guidance of his instructor he fabricated his models--

first the simplest sort with a propeller and a rubber band motor, then timer-equipped models with tiny gasoline engines, and after that, cord-controlled airplanes. When he was 17 years old, Komsomol member Aleksandr Molodchiy joined a glider circle and learned to fly a glider beneath the clouds. After that there was the aeroclub, aviation school and familiarization with bomber aviation. He fell in love with the heavy airships with all of his heart. And when the cadet was offered a choice on graduating from school with outstanding grades, he said confidently:

"I would like to be sent to long-range bomber aviation."

The famous pilot remained faithful to long-range aviation all of his life. He participated in long-distance flights, and he landed airplanes in bad weather many times. In 1942, high-power Soviet bombs dropped from beneath the wings of his bomber on military objectives in Berlin. Being among the best six pilots of long-range aviation, Aleksandr Ignat'yevich Molodchiy earned the lofty title of Hero of the Soviet Union twice. His life in aviation is an example to many cadets and young pilots.

Why does our medicine turn so much attention to investigating the temperament of the applicant during psychological selection? The fact is that temperament is what primarily characterizes the individual in relation to the dynamic features of his mental activity--the rate and intensity of mental processes and states.

The teaching on temperament has now been existence for two and a half thousand years. It was based on the idea that all bodies, including the human body, consist of the same components--"elements." As with the state of the body, according to these ideas the state of the soul depends on the relationship between these components. If the mixture is proportionate, then the individual is healthy, in mental harmony; but if there is too little or too much of some element, a propensity for certain diseases and disproportions in character arise. This individual proportion or disproportion is what has come to be called "temperament."

Four basic types of people are distinguished by temperament: cholerics, sanguinists, phlegmatics and melancholics. The basic types of temperament are rarely encountered in pure form. A combination of individual traits representing different temperaments coupled with a certain propensity toward one of the types is observed in most people.

(To be concluded)

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COMBAT AVIATION IN FALKLANDS CONFLICT DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 83 (signed to press 3 Feb 83) pp 46-47

[Article based on foreign publications by N. Novichkov: "Combat Aviation in the Anglo-Argentine Conflict"]

[Text] (Conclusion. See No 2 for start)

GR.3 Harriers equipped with American laser bombs flew one combat sortie to suppress coastal artillery shelling the carrier-based strike force. The target was illuminated by the AN/AVQ-9 "Pave Way" system, which the U.S. Air Force used in Vietnam, by a ground controller in the combat formations of the English assault landing troops, and a pair of strike aircraft dropped the bombs after the semiactive laser homing heads of the bombs locked onto the laser beam reflected from the target.

GR.3 Harriers were used by the air force for other than strike operations. Air-to-air AIM-9L Sidewinder missiles equipped with 360° aspect infrared homing heads and new active contactless laser detonators were mounted on these airplanes by the time they were relocated to Ascension Island. These missiles had also been supplied to naval Sea Harrier deck-landing airplanes. For a week prior to going aboard a container carrier, the pilots practiced the tactics of close group aerial combat, for which the Harriers were not intended, on the island.

To provide air defense to the carrier task force, the plans called for pairs consisting of a Sea Harrier carrying airborne target detection radar and a Harrier to fly patrols and act as cover groups. In this case the pilot of the Harrier was to perform the role of follower. At the same time Harriers, which possess a more precise sighting and navigation system and laser rangefinders, performed the role of leaders in strikes on ground objectives, while the Sea Harriers acted as followers. Both types of airplanes had nose cameras to record bombing results, and the Harriers could carry pods containing equipment for day and night reconnaissance.

In the opinion of foreign specialists the personnel of the Argentine air forces operating in group attacks demonstrated high piloting and tactical proficiency when penetrating the air defenses of the carrier task force at

low and minimum altitudes, when maneuver was limited owing to closeness of the water and when the complex weather conditions created great difficulties. However, in close fluid aerial combat at low and moderate altitudes, despite the numerical superiority of Argentine Skyhawks, Mirages and Daggars, the Sea Harriers and Harriers had the advantage. The fact is that English pilots, who were better trained and exhibited group coordination, competently utilized the combat characteristics of their airplanes and armament, as well as target data from long-range radar ships. Inasmuch as English airplanes did not possess airborne radar for detection of low-flying targets in the lower hemishpere, in a number of cases Argentine pilots were able to penetrate the air defenses of the carrier task force at low and minimum altitude. On the other hand, however, English pilots were sometimes able to intercept them and attack them from below and attack them from the forward hemisphere.

In close aerial combat, English fighters effectively employed control of the thrust line in horizontal flight. Inasmuch as Argentines primarily used AlM-9B sidewinder missiles with an obsolete infrared homing head, an effective attack required attainment of the enemy's rear hemisphere. However, as soon as an English pilot detected an Argentine Mirage or a launched missile behind him, he immediately reversed engine thrust by rotating the exhaust jets, and the Sea Harrier or Harrier braked sharply, changing its angular position. As a result the airplane or missile charged ahead, and English pilots found themselves in an advantageous position for attack. In turn, to break away from an English airplane on their tail, Argentine pilots used defensive maneuvers with the afterburner, which reduced their fuel reserve. For this reason six Argentine craft fell into the sea after breaking off the attack.

The English engaged in aerial combat using American AlM-9L Sidewinder missiles with an improved infrared homing head sensitive to all heat sources (for example the heated leading edges of the wings). This made it possible to launch them from the forward hemisphere when attacking airplanes traveling head-on. Thus in one of the air battles a pair Sea Harriers attacked a group of four Skyhawks and knocked down three airplanes. The fourth Argentine airplane fell into the sea while performing an antifighter maneuver at low altitude. In another battle Sea Harriers attacked a group of Canberra bombers accompanied by six Daggars. Three Daggars were knocked down, and one Canberra was seriously damaged. Employing the thrust reversal method the English pilots evaded five missiles launched at them, one of which hit the Canberra.

In the estimation of English specialists the Sea Harriers and Harriers knocked down 34 Argentine airplanes in aerial combat, while the English did not lose a single aircraft. Over 28 airplanes were annihilated by AlM-9L Sidewinder missiles, and the rest were brought down by fire from Aden 30-mm guns.

On 21 May 1982, when operations against the English assault landing force were begun, Argentine aviation faced a complex situation. Most of the airplanes that took off from southern continental airfields had a maximum combat radius that did not exceed the distance to the Falkland Islands. This significantly limited the choice of directions and maneuvers to be used in penetrating the air defenses of the carrier strike force and in making strikes from the air,

and it reduced the time airplanes could be in the region of combat operations to 2-3 minutes. On surmounting two air defense lines, the Argentine pilots could make only one attack run against a target on the water surface.

In view of the acute shortage of guided antiship missiles the Argentine pilots used bombs and obsolete free-flight rockets against ships of the carrier task force. This necessitated visual contact with the target. In the face of dense defensive fire from surface-to-air guided missiles and light antiaircraft artillery they displayed courage and heroism, and in most cases they penetrated the defenses of the English ships. However, because it was impossible to maneuver in altitude when attacking at minimum altitude, the ships did not blow up, since there was not enough time for the safeties on the percussion fuses to work. Otherwise, foreign specialists estimate, the English would have lost 14 warships.

After the English assault landing force was landed, the air defense system of the carrier task force changed somewhat. The first line of defense was represented by ships carrying Sea Dart and Sea Slug antiaircraft guided missiles and by Sea Harrier VTOL aircraft, which continuously patrolled near the west coast of West Falkland. Over 10 ships carrying Sea Wolf and Sea Cat antiaircraft guided missiles stationed in the northeastern portion of Falkland Sound performed the function of a second antiaircraft line of defense to cover the assault landing forces.

Argentine aviation attacked the assault landing forces in groups consisting of several echelons. Up to 40 airplanes participated in a raid, most of which took off from continental airfields. In the opinion of English military reviewers the terrain in the vicinity of the port of San Carlos limited maneuver by attacking airplanes, and the lack of time would not permit effective target distribution. This is why bombing was ineffective. Argentine pilots operated more successfully against escort ships, inasmuch as the possibilities English ships had for maneuvering in the sound were limited. However, the Argentines did not use certain of their weapons such as "Super Etandar" [transliteration] airplanes armed with Exocet missiles, inasmuch as the active homing heads of these missiles were not adequately selective of targets on the water surface on the background of the cliffs in the strait. Moreover the remaining four Exocet missiles were intended for a strike on English aircraft carriers.

On 21 May Argentine aviation sank the frigate Ardent and seriously damaged another four ships, having lost 16 of their own craft in the effort. On 23 May Skyhawks sank the frigate Antelope with free-flight rockets and bombs. But two of the attacking airplanes were knocked down. To increase the amount of time aviation could remain in the region of combat operations and to insure effective maneuver, the command of the Argentine Air Force attempted to station C-130 tankers between the continent and the Falkland Islands, but after a Sea Harrier knocked down a C-130, this plan had to be abandoned.

In the opinion of American specialists Argentine pilots used effective tactics against targets on the water surface. They approached West Falkland, from the west and southwest at minimum altitude, concealing themselves behind terrain features. The raids were made as a rule at the end of the day with the

setting sun to the rear. Thus the antiaircraft guided missile and light antiaircraft artillery crews could not effectively use their optical target tracking systems. As an example shoulder-launched Blowpipe rockets were not used effectively by the assault landing troops. However, several Mirages were knocked down nonetheless.

Foreign specialists estimate that by the evening of 24 May the losses of Argentine aviation since the beginning of the conflict were 55 airplanes and several helicopters, while the English had lost five Sea Harrier VTOL aircraft, 11 helicopters and five combat and cargo ships during this time. Several damaged ships were escorted to a safe zone.

While prior to this time the Argentine command organized one or two mass raids per day, in late May only three or four pairs of airplanes made attacks in the course of a day, and Canberra bombers were used at night.

American military specialists believe the following to be the main causes of the large losses of Argentine aviation: presence of Argentine airplanes in the vicinity of targets for too short a time; inadequacies in logistical support and shortages of spare parts, fuel, armament, service personnel and flight crews; inadequate preparation of flight crews in naval aviation for combined-arms missions; an inadequately developed system for controlling combat operations; absence of suitable air bases to increase the combat radius of Argentine airplanes and, consequently, the impossibility of utilizing new, effective tactics. Another shortcoming of Argentine aviation was that the fighter-bombers were not equipped with electronic suppression resources.

Attempting to turn the course of the combat operation, the command of the Argentine Air Force gave the "Super Etandar" squadrons the mission of seeking and destroying the English aircraft carriers. They were to be guided to their targets by coastal radar. However, by this time French specialists had transmitted recommendations to the command of the carrier task force on how to fight Exocet missiles.

On 25 May, after air-to-air refueling, a pair of Super Etandars flew undetected at an altitude of 30 meters with their onboard radar off to the location of the main forces of the carrier task force. Turning on their radar sets 80 kilometers from the expected location of the carriers, the Argentine pilots detected one large target surrounded by a large number of small ones. But inasmuch as the airplanes were detected after they turned their radar sets on, the pilots launched antiship missiles at the target from a range of 48 kilometers and immediately headed back to the continent at minimum altitude. The Exocet missiles hit a cloud of dipole reflectors released by ships and airborne helicopters. The heads of the missiles were disoriented, but after emerging from the cloud of interference they locked onto the container ship Atlantic Conveyor with a displacement of 15,000 tons. It was sunk together with three Chinook helicopters and 12 Wessex helicopters aboard (by this time the VTOL aircraft were already on the aircraft carriers).

In the course of the Anglo-Argentine conflict, according to English sources, the Argentine Air Force lost over 80 airplanes in the air while the British

navy and air force lost seven VTOL aircraft and more than 20 helicopters. Sea Harrier VTOL aircraft flew 1,500 sorties from aircraft carriers while Harrier VTOL aircraft flew 150 combat sorties. Frequently the same airplane flew six sorties in a day with an average duration of 1.5 hours each. After a beachhead was seized in the vicinity of San Carlos, some of the VTOL aircraft operated from specially prepared fields covered with pierced steel planking.

Basing themselves on an analysis of the results of combat operations during the conflict, English military specialists have suggested some measures that must be undertaken to raise the effectiveness of aviation and missile armament. They recommend reinforcing a carrier taks force with AWACS airplanes for timely protection against group and single attacks by low-flying targets and their interception beyond the range of antiship missiles (modified Sea King helicopters will be used for this purpose; use of balloons, dirigibles or remote-controlled craft has also been proposed). They also recommend: creating remote-controlled reconnaissance craft; improving the radioelectronic countermeasure system for action against antiship missiles that fly a flat trajectory over the water surface; reinforcing the carrier task force with long-range interceptors and maneuverable airplanes for group aerial combat. They should provide protection against enemy airplanes that penetrate the first line of defense in a massed raid; improving the onboard systems and armament of Sea Harrier and Harrier VTOL craft to detect and destroy low-flying targets in the lower hemisphere at great range. Onboard radar sets and Sky Flash air-to-air missiles will be modified for this purpose; outfitting air force and naval airplanes with more weapons that can be launched outside the zone of enemy antiaircraft fire, particularly the Sea Eagle antiship missile.

Experts also suggest that more-effective long-range antiaircraft guided missiles must be designed for protection of the most important targets in a carrier task force, and supplying ships with Sea Wolf antiaircraft guided missiles and rapid-fire radar-controlled automatic weapons such as the Vulcan-Phalanx; hastening development of cluster weapons for destruction of landing strips, similar to cassette weapons such as the IP 233. In order to improve air-to-air refueling of all types of airplanes and eliminate the shortcomings revealed in Victor tankers, a decision was made to reequip nine VC.10 passenger airplanes as tankers by the mid-1980s (until VC.10s are available as tankers, six Vulcans and three C-130 Hercules aircraft will be used in addition to Victors). There are plans for providing protection to helicopters against shoulder-launched missiles, and for raising the safety of helicopter flight at night and in adverse weather.

According to foreign press reports the English Defense Ministry is meticulously analyzing the experience of the combat operations in the Anglo-Argentine conflict in order to make the appropriate conclusions for the future.

The military conflict between Argentina and England over the Falkland Islands once again demonstrated to the entire world that whenever the "vital interests" of imperialism are at stake, it becomes oblivious to all rules of international law, and armed aggression becomes the sole means of resolving disputes. In order to strangle the claims of the Argentines upon their own territory, the

English government launched an armada of warships and warplanes against the islands with the consent and support of the United States.

Great Britain won the "victory." But the weight of its military grandeur pulled the authority of the English Tory cabinet down into the dirty bog of greedy colonial ambitions. The peoples of all the world were persuaded with their own eyes that words spoken by imperialists about peace and concern for human rights have nothing in common with their criminal acts of plunder.

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